AGRICULTURAL RESEARCH INSTITUTE

PUSA

TROPICAL DISEASES BULLETIN

ISSUED UNDER THE DIRECTION OF THE HONORARY MANAGING COMMITTEE OF THE TROPICAL DISEASES BUREAU.

General Editor:
THE DIRECTOR OF THE BUREAU.

VOL 1.

NOVEMBER 15, 1912—MAY 15, 1913.

London:
TROPICAL DISEASES BUREAU,
Imperial Institute, S.W.

Sold by BAILLIÈRE, TINDALL & COX,
8, Henrietta Street, Covent Garden, W.C.

1912—1913.

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PLATE.

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ERRATA.

p. 14, third line from end of first paragraph. For the words "Over three weeks" read "Over three months."

p. 52, line 13 from top, for "p. 263" read "p. 236."

p. 75, line 14 from bottom, for "in a dilution of $\frac{1}{10}$" read "in a dilution of $\frac{1}{30}$."

p. 87, lines 11 and 12 from top, for "These glands were not hard as a rule, but formed soft masses (varicose groin glands)" read "These glands were not soft but formed hard masses (*Drusenpakete*)."

Dr. Fülleborn has pointed out in a letter that the words *harte* and *weiche* were accidentally transposed in the German original.

p. 316, line 8 from top, for "feet [sic]" read "gut." Capt. **Knowles** writes that this was the word used in his MS.

p. 432, line 11 from top, and p. 440, line 3 from bottom, for *Schistosomum* read *Schistosoma.*

p. 676. In the formula of **Ponselle's** modification of the N.N. medium, for "unwashed gelatine" read "unwashed agar."

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

No. 1.] 1912. [Vol. I.

*KALA AZAR.

INDIAN KALA AZAR.

PATTON (W. S.). **The Development of the Parasite of Indian Kala Azar (*Herpetomonas Donovani*, Laveran and Mesnil) in *Cimex rotundatus*, Sign. and in *Cimex lectularius*, Linn. with some Observations on the Behaviour of the Parasite in *Conorrhinus rubrofasciatus*, de Geer.**—*Sci. Mems. by Officers of the Med. and Sanit. Depts. Govt. of India.* Calcutta. 1912. New Ser. No. 53. 38 pp. and 1 plate.

This is a fuller account of observations already briefly reported by the author (*Kala Azar Bulletin*, No. 3, p. 124). He first reviews his previous work, in which he showed that the leishmania failed to flagellate in *Pediculus capitis*, *Pediculus vestimenti*, *Culex fatigans*, *Neocellia stephensi*, *Stegomyia sugens* and *Ornithodorus savignyi*, but developed to the flagellate form in *Cimex rotundatus*. Since his earlier observations he has only on one occasion failed to find parasites in the peripheral blood in undoubted cases of kala azar and in this case they were found later by DONOVAN. He passes in review and criticises the experiments conducted by BASILE, SANGIORGI, ALVARES and Pereira da SILVA, and FRANCHINI.

BASILE's flea transmission experiments are further criticised because of the difficulty of excluding natural infection in the dogs used and because he fails to mention the possible occurrence of piroplasma in these animals, though certain stages of this parasite in the spleen of dogs can readily be confused with leishmania.

In the experiments recorded in the present paper the author used only bugs which had been hatched in the laboratory, and had their first feed on a kala azar case in which parasites were numerous in the peripheral blood. Many of the bugs were fed several times and some had a feed from a second case of kala azar.

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* **Dr. WENYON's review of the literature forms a continuation of the *Kala Azar Bulletin* (Nos. 1, 2, and 3, 1911-12).**

(26770—2.) Wt. P 1691—43. 2000. 11/12. D & S.

One batch however fed only once. As a result of the dissections it was found that the bugs which had fed shortly before for the second or third time were either uninfected or showed only the degenerating remains of flagellates which had developed from the parasites taken up at the first feed. In those bugs, however, in which a sufficient time had elapsed since the last feed on the case or which had had only a single feed, the developmental forms were much more numerous and in several an enormous multiplication had taken place and masses of rosettes were seen. This observation shows that for the complete development to take place it is essential that the bug does not have a second feed, for there is some substance in the blood of man which destroys the developmental forms. In two instances a similar destruction took place after the bugs had fed on a monkey, so this substance, which the author concludes is complement, occurs in the monkey also. To this fact he attributes the tendency of kala azar to remain endemic in Madras, and oriental sore in Cambay, without spreading beyond these limits, for the number of bugs capable of transmitting the disease must be greatly reduced by their habit of feeding repeatedly.

The point most emphasised by the author is that, after the ingested parasites have developed into the elongated flagellates, these again pass through a developmental process, terminating in the formation of small post-flagellate forms. These as a rule are slightly larger than the corresponding pre-flagellate forms; they resemble them only in shape, for they show marked differences in staining reaction. The formation of these post-flagellate forms from the flagellate commences on about the eighth day and is completed by the twelfth. The mature flagellates on the seventh to the ninth days become altered in appearance, the blue-staining protoplasm characteristic of the earlier forms gives place to a pink-staining protoplasm, and these forms gradually give rise to the post-flagellate forms. The author points out that it is important to note that when they appeared in the bugs the post-flagellate forms were the predominating forms, whereas in the bugs dissected a few days previously flagellates predominated.

The author believes that the post-flagellate forms gain entrance to a new host by being regurgitated from the gut while the bug feeds, for the whole of this development takes place in the mid gut. The development takes place in *Cimex lectularius* as well as in *Cimex rotundatus*; so that the author believes that the parasite of Mediterranean kala azar will be found to undergo its development in *Cimex lectularius*. He finds himself in complete agreement with Gabbi, who does not think that the cases of Mediterranean kala azar are of canine origin.

The author then criticises the view that has been put forward by some observers (Mesnil, Wenyon) that the development of leishmania in the bug takes place on account of the large quantity of blood in the stomach and is comparable to the culture in the test tube. Against this view it is pointed out that, though the blood suckers mentioned at the commencement of this review all suck up quantities of blood, there is no development of the parasite in them. The same lack of development was noted in the case of the nymph of *Conorrhinus rubrofasciatus*, though this is about as large as the adult Cimex and gorges itself with blood. He doubts very much whether the forms seen by Wenyon in *Stegomyia fasciata* which had fed on oriental sores in Bagdad were in reality developmental forms of leishmania.

The author then discusses the biological position of the parasite of kala azar. He points out that it agrees with the typical Herpetomonas of an insect in having a pre-flagellate, a flagellate and a post-flagellate stage, so that he sees no reason for placing it in a new genus. He writes:—

> "As the parasite of sleeping sickness passes one stage of its life history in the blood and organs of man and its multiplicative stage in an invertebrate, *Glossina palpalis*, so in the same way the parasite of Indian kala azar passes one stage of the life history in the blood and organs of man and its multiplicative stage in an invertebrate, *Cimex rotundatus*; there would, however, be no justification for placing the parasite of sleeping sickness in any other genus but the Trypanosoma."

[It is however this agreement with the life history of the trypanosome that justifies the genus *Leishmania*. For *Trypanosoma gambiense* agrees with other species of trypanosome in having a vertebrate and an invertebrate host, whereas the parasite of kala azar differs from the true Herpetomonas in having two hosts, the true Herpetomonas having only one and that an invertebrate. The fact that the parasite of kala azar has two, a vertebrate and invertebrate host, distinguishes it at once from the Herpetomonas.]

In a note to the paper Captain PATTON records the successful intraperitoneal inoculation of a white rat with the parasite of Indian kala azar. The rat was inoculated with 3 cc. of emulsion of spleen from a case of kala azar. Fifteen days later it received a second injection of 1 cc.; it died two hours later. Its liver and spleen were considerably hypertrophied and contained large numbers of typical parasites. This is the first instance in which an animal has been infected with Indian kala azar.

C. M. Wenyon.

SUDAN KALA AZAR.

MARSHALL (W. E.). **Further Experimental Investigation into Sudan Kala Azar.**—*Jl. R. Army Med. Corps.* 1912. Sept. Vol. 19. No. 3. pp. 276–280. With 1 plate.

In previous publications it was shown that the Sudan kala azar affects people of all ages, but is most common in late childhood or early adult life; that the grey monkey (*Cercopithecus sabaeus*) can be infected by intraperitoneal or subcutaneous injection of virus; that the parasite grows readily in ten per cent. citrate on NOVY and MACNEAL's medium and in NICOLLE's medium; and that the parasite is present in the peripheral blood in a large percentage of the cases. The author now points out that, whereas it was formerly stated that the parasites were not numerous when present in the peripheral blood, two cases have since been examined in which they were very numerous; one patient was in an early stage of the disease and the other in an advanced stage. The eosinophile cells are usually much diminished or absent from the peripheral blood; this feature is of some help in differentiating kala azar from malaria. No drug has been of any use in checking the course of the disease. It has been found that dogs, especially young ones, are susceptible to the Sudan kala azar and that, though they can be infected by injecting emulsions of the organs of other infected dogs or monkeys, the injection of material obtained by spleen puncture from man is most certain. Of four dogs injected one was killed on the 145th day; the others died on the 128th, 95th and 74th days respectively.

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* Dr. ROW has reported, in a paper shortly to be published, the successful inoculation of monkeys subcutaneously on the forehead with *Leishmania donovani*. In one case the virus was obtained from the spleen of a case of kala azar; in the other, cultures were used. Two monkeys developed at the site of inoculation lesions which contained leishmania and resembled oriental sore.

Attempts were made to transmit the disease from one dog to another by keeping a healthy and infected dog in the same room and introducing dog fleas. The dogs were in contact for thirty-seven days, but no infection occurred. In another experiment a pup was put in a box with a dog for 124 days four days after the latter was inoculated. The dog became infected, but the pup was free from infection when killed two months later. A similar experiment was carried out with ticks, but was also unsuccessful. A series of experiments was carried out to determine by what means the disease may be conveyed from monkey to monkey. In each case a healthy and infected monkey were kept together in a cage. In some cases the monkeys were freed from all insects; in others they were not. In some the cages were of close gauge; in others they were open, so that mosquitoes could enter. In no case did a certain infection take place. The author points out that though it is generally possible to infect monkeys one of these animals was naturally immune.

C. M. W.

MEDITERRANEAN KALA AZAR.

LIGNOS (Antoine). **Absence des Leishmania à l'Autopsie d'un Enfant mort de Kala Azar.**—*Bull. Soc. Path. Exot.* 1912. June. Vol. 5. No. 6. pp. 349–351.

A case of kala azar in a female child of 23 months came under observation in the Isle of Hydra in October 1911. The author performed spleen puncture on March 6th, 1912, and discovered numerous leishmania in the smears. On April 12 the child was treated by some aged women in such a manner that it died suddenly from dyspnoea. An autopsy was performed eighteen hours after death and though the body was in good condition no leishmania could be discovered in the smears. The author contents himself with recording the fact, and offers no explanation of the complete disappearance of the parasites in a period of one month intervening between the date of spleen puncture and the child's death.

C. M. W.

Cardamatis (Jean P.). **Le Kala Azar est en Grèce une Maladie à Cas sporadiques.—Mégalosplénies de Cause inconnue.**—*Bull. Soc. Path. Exot.* 1912. July. Vol. 5. No. 7. pp. 489–491.

The author requested the medical practitioners in various parts of Greece to send him films of material obtained from the puncture of spleens in cases of suspected kala azar. In an examination of these films, and of three others from cases which came under the author's notice, leishmania were found in two cases only, from the province of Patras. The author points out that, outside the endemic centres in the islands of Spezzia and Hydra and the district around Patras and probably also the islands of Cephalonia, Ithaca and Paxos, kala azar is not as common as was at first thought. In the rest of Greece the cases occur sporadically; they have been reported in isolated instances from Athens, Piraeus, Nauplia, Almyros, Volo, Trikkala, Poros and elsewhere. Between May 1910 and the date of this paper fifty cases have been notified in Greece. The author points out that leishmania have never been found in the peripheral blood of these cases of kala azar and that a disease other than leishmaniasis, characterised by splenomegaly, exists in Greece.

C. M. W.

Jemma (R.). **Considerazioni sopra Sessantatrè Casi di Anemia da Leishmania osservati nella Clinica Pediatrica di Palermo.** [On sixty-three Cases of Kala-Azar seen at Palermo.]—*Riforma Medica.* 1912. Aug. 24. Vol. 28. No. 34. pp. 925–930.

These cases were seen at the clinic at Palermo between October 1909 and August 1912. The majority came from the suburbs and outlying districts, only three from Palermo itself. The cases occur, as a rule, quite sporadically, but certain endemic centres exist. The association of the disease with that of dogs forms the subject of a separate paper, *vide* p. 11. The author believes that the disease is transmitted from dogs to children, as was first suggested by Nicolle and demonstrated by Basile. Of the 63 patients five were over four years of age, the eldest being six; 35 were males and 28 females; most were from families in poor circumstances. The chief symptoms of the disease are considered, but nothing new is recorded. The parasite has been cultivated on the NNN medium, on a similar medium made up with human serum and ascitic fluid, and on the Bordet and Gengou medium.

As regards prognosis, of the 63 cases twelve were lost to view after the first visit, 38 have died, five are in a serious condition, four are stationary, one is much improved, and three have recovered. These three patients have been in perfect health for over a year and search for the parasite has been unsuccessful, though in two the spleen has not yet quite regained its normal volume. In earlier publications the author stated that he doubted if spontaneous recovery ever occurred. He now modifies this view and agrees with Nicolle, Spagnolio and Lignos, who have recorded recoveries. There was no possibility of an error of diagnosis in the three cases, for parasites had been discovered in each. None of the therapeutic measures adopted was of any avail; the recovery of the three patients was not due to any special line of treatment. It is pointed out that after the common diseases—tuberculosis, the exanthemata, and diphtheria—the most frequently encountered infectious malady in Palermo is infantile kala azar; the author believes it to be widely spread in this district.

C. M. W.

CARYOPHYLLIS (G.) and SOTIRIADES (D.). **Zur Behandlung und Heilung des Kala-Azar mit Salvarsan.** [The Treatment and Cure of Kala Azar by Salvarsan.]—*Deut. Med. Wochenschr.* 1912. Aug. 15. Vol. 38. No. 33. p. 1554.

The authors refer to their earlier paper on this subject (see *Kala Azar Bulletin* No. 2, p. 92). The present one records the treatment of a case of infantile kala azar in Greece. The child was under treatment for seven months and in this time received intravenous injections of salvarsan every eight or fifteen days in doses of 0·3-0·4 grams, in all three grams. Since the treatment was suspended all signs of the disease have vanished. The authors regard their patient as having been cured by the drug. They point out that to give a drug by the intravenous method is a difficult operation in a small child, so that the general failure of salvarsan in this disease is due to the employment of the more easily applied intramuscular method. That the recovery of the case was due to the treatment and not to nature is shown by the fact that each injection was followed by signs of improvement.

C. M. W.

Di CRISTINA (G.). **Ancora sulla Deviazione del Complemento nella Anemia da Leishmania.** [On Complement Deviation in Infantile Kala Azar.]—*Pathologica.* 1912. July 15. Vol. 4. No. 89. pp. 409–410.

The author is led to publish his results, though only seven cases have been studied, on account of the paper of MAKKAS and PAPASSOTIRION (reviewed in *Kala Azar Bulletin* No. 2, p. 88). These authors claim that the deviation of the complement is of constant occurrence in infantile kala azar and is thus of diagnostic importance. Di Cristina has not been able in his cases to demonstrate the presence of any antibody in the blood in spite of the most careful observations and precautions in the preparation of the antigen, which moreover gave positive results in the case of rabbits injected with cultures of leishmania. The technique was that generally used in the Wasserman reaction. The spleen of a child which had died of kala azar was used. It contained an enormous number of parasites. The organ was broken up and dried in vacuo. Tests were made also with cultures of the parasites killed by an hour's exposure to a temperature of 55° C. The author points out that Professor LONGO has obtained similar negative results, so that the reaction cannot be of diagnostic importance, as MAKKAS and PAPASSOTIRION maintain. He believes however that the absence of a reaction indicates that the organism does not react to the infection.

C. M. W.

Di Cristina (G.) and Caronia (G.). (i.) **Primi tentativi di Vaccinazione graduale nell' Anemia da Leishmania con Culture morte.** [Attempts to treat Infantile Kala Azar by Vaccination with Killed Cultures of Leishmania.] (ii.) **Sulla Presenza di Ambocettori specifici in Bambini affetti da Anemia da Leishmania guariti Spontaneamente.** [On Specific Amboceptors in the Blood in Cases of Infantile Kala Azar which have recovered Spontaneously.]—*Pathologica.* 1912. Sept. 1. Vol. 4. No. 92. pp. 519–522 and pp. 534–535.

(i.) Caronia has shown that the injection of killed cultures into healthy children causes the formation of antibodies and Di Cristina has shown the same in the case of rabbits. The following technique was used. A culture of the leishmania was obtained by spleen puncture of the child to be treated. The NNN medium was used and the culture allowed to develop for ten days, after which the water of condensation contained a fairly uniform number of flagellates. The cultures were inactivated at a temperature of 55° C. Ten cubic centimetres of culture were injected in ten days. After the tenth injection blood was taken from the finger and tested for the reaction of complement deviation, an aqueous extract of a dried, heavily infected, kala azar spleen being used as antigen. Seven cases were treated in this way. The authors found that the course of the disease was in no way altered. About a month after the treatment two of the cases had died. In one case the treatment produced a marked leucocytosis, while in the others there was only a slight increase in the leucocytes. An important result was the appearance in every case of a specific amboceptor though before treatment there was no specific antibody in the blood, a result showing that the organism under the stimulus of dead cultures is able to acquire an immunity reaction. It is pointed out that a similar absence of spontaneously produced immunity reaction is seen in the case of suckled infants suffering from syphilis or tuberculosis, and that in the latter disease injection of tuberculin will assist in the development of specific antibodies.

(ii.) In the second paper the authors record two instances of spontaneous recovery from kala azar. In both cases parasites had been demonstrated by spleen puncture. In both the recovery was accompanied by disappearance of the febrile symptoms, reduction in the size of the spleen, and an amelioration of the general condition. The authors found that the recovery in both cases was associated with the presence of a specific amboceptor in the blood. The test was conducted as in the other cases with the aqueous extract of the heavily infected spleen as antigen. This observation supports their hypothesis that the severity of the disease is due to the absence of immunity reaction, and justifies their attempt to produce such an immunity by the injection of killed cultures. The paper closes with an account of the clinical features of the two cases.

C. M. W.

CANNATA (Sebastiano). **Sul Potere Agglutinante del Siero di Sangue nell'Anemia da Leishmania rispetto ad alcuni Germi Patogeni.** [The Agglutinating Power of Blood Serum of Cases of Infantile Kala Azar with reference to other Pathogenic Organisms.]—*Pathologica.* 1912. Aug. 15. Vol. 4. No. 91. p. 482.

The author has tested the agglutinating power of the serum of twenty cases of infantile kala azar against the following organisms—*Micrococcus melitensis*, *Bacillus typhosus*, *B paratyphosus* A and B, and the bacillus of Koch. None of the cases gave any agglutination of the last-named organism. Four serums agglutinated the *melitensis*, three in dilutions of 1:25 and one in a dilution of 1:10. One of the first three agglutinated in addition the three organisms of the typhoid group in dilutions of 1:10, and another of these agglutinated the paratyphoid B in a dilution of 1:25. The cases giving agglutination were in children varying in age from thirteen to 24 months and the disease was of twenty days to ten months' duration. The author does not state whether he has made control tests with healthy children.

C. M. W.

PETROW (N. W.). **Ein Fall von Kala-Azar.** [A Case of Kala-Azar.]—*Virchow's Archiv f. Path. Anat. u. Physiol.* 1912. Sept. 7. Vol. 209. No. 3. pp. 453–456. **Sluchai tropicheskoi Splenomegali** (Kala Azar).—*Russk. Vrach.* 1912. No. 26.

In these papers the author gives a detailed account of the disease and post mortem findings in a case of kala azar in a woman 38 years of age, who died of that disease after returning to St. Petersburg from Tschardschui in Turkestan. The symptoms noted do not call for particular mention, but it is interesting as being the first recorded case of the disease in an adult from that district, other cases having been in young children.

C. M. W.

SPAGNOLIO (G.). **Sulla Vitalità della** *Leishmania donovani* **in simbiosi con i Germi delle Malattie Infettive Intestinali e con lo Streptococco piogene.** [On the Vitality of *L. donovani* in Symbiosis with Bacilli of Various Intestinal Infections and with *Streptococcus pyogenes.*]—*Malaria e Malat. d. Paesi Caldi.* 1912. May–June. Vol. 3. No. 5/6. pp. 151–152.

This paper describes experiments made to test the effect of various organisms (*Bacillus coli*, Gärtner's bacillus, Shiga's bacillus, Flexner's bacillus, *Bacillus typhosus*, *B. paratyphosus* A and B, *Micrococcus melitensis* and the comma bacillus of Koch) on cultural forms of leishmania. The experiments were conducted in three ways: firstly by adding flagellate forms of leishmania to well developed cultures of the organisms, secondly by inoculating a fully developed culture of leishmania with the organisms, and thirdly by inoculating the medium simultaneously with the leishmania and the bacilli. All these organisms except the *Micrococcus melitensis* proved fatal to the flagellates, which disappeared from the cultures as the bacteria multiplied. Even in the second series, in which the bacteria were added to a well developed culture of flagellates, these survived only 24 to 36 hours. Similar results were obtained with streptococci and staphylococci. In the case of the *M. melitensis* added to well developed culture of leishmania the flagellates were still alive after fourteen or fifteen days, after which time they gradually disappeared as the bacteria developed. *M. melitensis* is thus seen to be the only organism with which the leishmania will grow for any length of time.

C. M. W.

FRANCHINI (G.). **Leishmanie e Zanzare.** [Leishmania and Mosquitoes].—*Riforma Medica.* 1912. Sept. 7. Vol. 28. No. 36. pp. 981–982.

In his earlier papers the author has shown that mosquitoes can be infected with the leishmania of infantile kala azar by feeding them on cultures of the organism. He has now fed mosquitoes, obtained from the plains round Catania, on material obtained by spleen puncture, and has thus induced them, though with the greatest difficulty, to take up unaltered parasites. These were found in the mosquitoes after four, six, and eight hours, some in unaltered condition, others slightly changed. Some appeared to be degenerating; others were in groups of five to six, or eighteen to twenty parasites. No flagellate forms were seen. After thirty hours some large forms were detected, comparable with the large non-flagellate forms met with in cultures. After 48 hours in two preparations many parasites were found, some in rosettes, some in masses composed of numerous parasites closely resembling leishmania. Still no flagellate forms were seen. Finally, in one preparation from a mosquito which had taken up spleen juice four days before flagellates were found, and the author had no hesitation in identifying these with leishmania. He states that he has avoided the possibility of confusing these forms with natural flagellates of the mosquito by dissection of many control mosquitoes, in which no flagellates having the remotest resemblance to the leishmania could be found.

C. M. W.

VISENTINI (Arrigo). **Mécanisme de l'Immunité Naturelle du Rat et du Cobaye à l'égard des Cultures de *Leishmania infantum*.**—*Bull. Soc. Path. Exot.* 1912. June. Vol. 5. No. 6. pp. 358–360.

The author has attempted to infect twenty guinea-pigs and ten rats by the intraperitoneal injection of 2-4 cc. of culture of *Leishmania infantum.* The animals were examined from two hours to 93 days after inoculation, but in no case was any flagellate found, nor did culture from the peritoneal fluid yield a positive result. The guinea-pig and white rat possess a natural immunity against *Leishmania infantum.* The author recalls the fact that FRANCHINI recorded the infection of a guinea-pig by intraperitoneal injection of culture (see *Kala Azar Bulletin*, No. 1, p. 8). The author examined the nature of the immunity of his guinea-pigs; he found that within five minutes after injection into the peritoneal cavity the flagellates are adherent to the leucocytes and soon become ingested by them. Within the leucocytes they quickly degenerate till only the nuclei remain. After three hours no vestige of the organisms can be found. During this time the flagellates never leave the peritoneal cavity as they cannot be found in the circulation. Culture of the flagellates has been obtained up to one and a quarter hours after injection into the peritoneal cavity.

[VISENTINI's experiments resemble those of DELANOË on the natural immunity of mice. (*Kala Azar Bulletin* No. 1, p. 53.)]

C. M. W.

YAKIMOFF (W. L.) et KOHL-YAKIMOFF (Nina). **L'Infection des Animaux de Laboratoire par la *Leishmania infantum* Ch. Nicolle. (Deuxième note preliminaire).**—*Bull. Soc. Path. Exot.* 1912. June. Vol. 5. No. 6. pp. 355–357.

In a former note (see *Kala Azar Bulletin* No. 3, p. 140) the authors showed that it was possible to produce a general infection in mice by intravenous injections of cultures of *Leishmania infantum*. They now record the production of a general infection in two dogs by such injections, and the infection of mice and rats by the inoculation of material from the organs of the dogs. Material obtained from the organs of these mice produced infection in other mice and also in one rat. In the former paper it was stated that the organs of mice infected by cultures had been injected into other mice. It is here stated that these mice became infected. The authors point out that the experiments, which are still in progress, demonstrate the possibility of carrying on a strain of leishmania in mice. It is important to note that in several instances in the case of rats and mice where microscopic examination had been negative as regards the presence of leishmania the culture test gave a positive result.

C. M. W.

MANTOVANI (Mario). **Infezione sperimentale da *Leishmania donovani* nel Coniglio. (Nota preventiva.)** [Experimental Infection of Rabbit with *L. donovani.*]—*Pathologica.* 1912. July 15. Vol. 4. No. 89. p. 415.

The author records the successful inoculation of a rabbit by the injection of one cubic centimetre of culture of leishmania into the marginal vein of the ear. Twenty days later the rabbit, which had become very thin, was killed. Both by culture and by examination of smears from the organs it was shown to have a general infection with leishmania.

C. M. W.

CANINE KALA AZAR.

NICOLLE (Charles) and CONOR (M.). **Quelques Expériences pratiquées avec le Virus de la Leishmaniose naturelle du Chien. Reproduction de la Maladie chez le Singe.**—*Bull. Soc. Path. Exot.* 1912. June. Vol. 5. No. 6. pp. 351–355.

The authors point out that kala azar has been successfully transmitted from one dog to another by inoculation in only one instance (SENEVET—*Kala Azar Bulletin* No. 3, p. 139). The present paper records the successful inoculation of two dogs from the organs of a dog which had been found naturally infected at Tunis. A further passage was made by inoculating the organs of one of these dogs into three other dogs and two monkeys. Of the three dogs only one became infected and its organs failed to infect another dog. One of the two monkeys (*Macacus sinicus*), a young one, became infected; its organs failed to infect a dog and a monkey. It is interesting to note that its death was due to sudden dyspnoea, a common cause of death in children suffering from the disease. Cultures were obtained from the first subinoculated dog. Their agreement with cultures of leishmania obtained from cases in children is absolute. The injection of fifty cultures intraperitoneally in two doses with an interval of 24 hours failed to infect a monkey, which died 49 days later. It is pointed out that young dogs are more readily infected than older ones.

C. M. W.

JEMMA (Rocco). **Sulla Leishmaniosi del Cane nei Dintorni di Palermo.** [Leishmaniasis of Dogs in the Environs of Palermo.] —*Pathologica.* 1912. Aug. 1. Vol. 4. No. 90. pp. 466–467.

The author points out that a previous examination of 227 dogs of Palermo for evidences of leishmania infection was negative (*Kala Azar Bulletin* No. 1, p. 17). In the investigation here recorded Dr. Carlo BASILE collaborated. Two cases of infantile kala azar, one from Carini and the other from S. Maria di Gesù, villages in the vicinity of Palermo, were studied as to their possible association with the disease in dogs. In the case of the child from Carini it was found that a dog in a neighbouring house was heavily infected with leishmania and the parents of the child admitted having killed their own dog on account of its bad condition. In the case of the second child such a direct association was not ascertained, but a masterless dog in poor condition was found to be harbouring leishmania. It has thus been demonstrated that canine kala azar occurs in all the endemic centres of the infantile disease on the Mediterranean littoral, Palermo hitherto having been regarded as an exception to this rule.

C. M. W.

TROPICAL SORE.

SPLENDORE (A.). **Leishmaniosi con Localizzazione nelle Cavità Mucose (Nuova Forma Clinica).** [Leishmaniasis with Lesions of the Mucous Cavities (a New Clinical Form).]—*Bull. Soc. Path. Exot.* 1912. June. Vol. 5. No. 6. pp. 411–438. With 1 plate.

In this memoir the author describes in detail his observations upon three cases of the Brazilian leishmaniasis, which is peculiar in that it produces lesions not only of the skin on the exposed parts of the body, but also of the mucous membranes of the nose, mouth, pharynx and larynx. Its features were well described in an earlier paper by the author and also by CARINI (*Kala Azar Bulletin* No. 2, pp. 104-105), and later by ESCOMEL under the name of La Espundia and by LAVERAN and NATTAN-LARRIER (*Kala Azar Bulletin* No. 3, pp. 167 and 168).

The author points out that the lesions on the skin resemble closely those of oriental sore, whereas the nasal, buccal, and pharyngeal lesions take the form of vegetations of framboesial type. An important feature of the disease, emphasised by the author, is the occurrence of irregular fever in periods of several days duration. It is usually attributed to malaria, but is resistant to quinine, and other evidences of a malarial affection are wanting. The lymphatic glands in the neck are enlarged and have been shown to contain leishmania. The blood shows a leucocytosis (12-16 thousand) with an increase in the large mononuclears. Leishmania have not been found in the peripheral blood except in that taken from the neighbourhood of the lesions. As regards treatment, nothing reduces the lesions in the mouth and nose; the author has tried radium exposures, X-rays, and injections of 606. Radium exposures are however, very efficacious in the case of the cutaneous lesions, which are quickly healed.

The leishmania which have been found by the author in the various lesions differ in no way from those of oriental sore. In pharyngeal growths, however, there occur some curious elongated forms, some of which are provided with flagella and thus resemble the forms seen in artificial culture. The parasites have been cultivated in the usual way on NNN medium; the cultures did not differ from those of oriental sore obtained by Nicolle. Experimentally the author has been successful in inoculating the virus from man into two monkeys (*Mico estrella*); with other animals he was unsuccessful. The injection of cultures in large quantity both intraperitoneally and subcutaneously into various animals (dog, rabbit, guinea-pig, rat, bat, cat, pigeon, bird, frog) was without result except in the case of one rat killed after a month which showed peculiar red granules in the spleen and liver like nuclei of leishmania. A monkey (*M. estrella*) inoculated in the frontal region with culture developed a small papule after forty days; no leishmania were found and it disappeared in fifteen days.

The author has not been able to solve the problem of transmission.

C. M. W.

Wenyon (C. M.). **A Supposed Peculiarity in the Structure of the Leishmania from Skin Lesions in South America.**—*Jl. Trop. Med. & Hyg.* 1912. July 1. Vol. 15. No. 13. pp. 193–194.

The author calls attention to the paper by Laveran and Nattan-Larrier (*Bull. Soc. Path. Exot.*, 1912, p. 176), describing a peculiarity in the leishmania from South America which they regard as of constant occurrence. It is stated by them that the trophonucleus instead of being round is very much flattened out, and lies like a rod or band along one side of the capsule of the parasite. The author points out that parasites showing this peculiarity are to be found in films of the Bagdad sore, and that in smears from South American sores many of the leishmania show the typical structure with a rounded trophonucleus, so that the flattening of the trophonucleus cannot be held to be a feature peculiar to the South American leishmania.

[In a more recent paper, reviewed below, Laveran and Nattan-Larrier record the finding of typical leishmania in cases of Espundia from South America.]

C. M. W.

LAVERAN (A.) and NATTAN-LARRIER. **Contribution à l'Étude de la Espundia. (Deuxième Note.)**—*Bull. Soc. Path. Exot.* 1912. July. Vol. 5. No. 7. pp. 486–489.

The following history of a case of Espundia is given.—A man 62 years of age had been 55 days in the mountainous region of Peru where Espundia occurs. He was bitten on the margin of the ear by some black fly. Fifteen days later an ulcer appeared at this spot and after one year the disease had so extended that in addition to the initial lesion on the ear there were ulcers on the feet, fingers, nose, mucosa of the nasal fossa, palate, pharynx, and larynx. The development of the disease was thus very rapid. In smears from the ear, nose, and throat lesions leishmania were discovered. Many of these had the structure of the classical leishmania, while others had the flattened nucleus, which the authors have called attention to in a previous paper. Reference is made to the work of SPLENDORE on the leishmaniasis of Brazil (*v. supra*). It is suggested that, just as one distinguishes *Leishmania donovani* and *Leishmania tropica* as two species, so it will be convenient to regard the American form as a variety under the name of *L. tropica* var. *americana.*

C. M. W.

SEIDELIN (Harald). **Leishmaniasis and Babesiasis in Yucatan.**—*Ann. Trop. Med. & Parasit.* 1912. July 31. Vol. 6. No. 2. pp. 295–299.

During a recent expedition to the Southern Mexican States the author examined six cases of a disease which is said to be widely distributed through the Yucatan peninsula. It commences as a rule in the form of an eroding ulcer on the margin of the ear. In one of the cases there was in addition a non-ulcerating nodule on the cheek; in others there were sores on the arm and leg. Leishmania were found in four cases and in largest number from the non-ulcerating nodule on the cheek. The author has noted the association of the leishmania with a diplococcus resembling the gonococcus. This was present in the cheek nodule. The author is "inclined to regard this coccus as primarily associated with the leishmania, in which case it would probably be of pathogenic importance."

[These cases are evidently of the same nature as those described by DARLING and CONNOR from Panama. (*Kala Azar Bulletin* No. 2, p. 110.)]

C. M. W.

WENYON (C. M.). **A Case of Dermal Leishmaniasis from S. America, with some Remarks on the Structure of the Parasite and its Culture.**—*Jl. London School of Trop. Med.* 1912. July. Vol. 1. No. 3. pp. 207–211. With 1 plate.

In this paper is described the case of an Englishman who contracted the disease on a journey through Peru and Bolivia. He had a raised granulomatous tumour, about three centimetres in diameter, over the right eye and nose, and a small depressed ulcer at the outer corner of the right eye. There was much

oedema of the eyelid on that side and the glands under the jaw were enlarged. Two hard lymphatic cords crossed the face from the neighbourhood of the sores to the enlarged glands. Leishmania were discovered in both the sores and from them a culture of the organism was obtained on NNN medium. The cultures closely resembled those of other types of leishmania. The parasites from the sore itself did not differ in any way from those obtained from the oriental sores of Bagdad and elsewhere. In the present case there were no lesions on the mucosa of the nose or mouth; the condition thus resembled the early stage of the disease described by ESCOMEL, and LAVERAN and NATTAN-LARRIER (*Kala Azar Bulletin* No. 3, pp. 167 and 168) and by SPLENDORE in the paper reviewed above. The case was treated in two ways. Injections of killed cultures of the leishmania were first given, but these had apparently little, if any, effect. Accordingly the ointment recommended by CARDAMATIS and MELISSIDIS, consisting of equal parts of methylene blue, lanoline, and vaseline, was used twice a day. Under this treatment the small sore healed completely in about one month and at the date of the paper the large sore had considerably improved. [It may be of interest to mention here that the large sore was treated with the ointment for two and a half months, and as it then showed some sign of healing the applications of methylene blue ointment were stopped. The sore had completely healed in another two weeks. Over three weeks have now elapsed and there is no sign of any recurrence. The glandular enlargement has almost completely disappeared.]

With material obtained from the sore a monkey (*Cynocephalus*) and a dog were inoculated on the ears and nose. After four months the monkey developed a papule on each ear and one on the nose. In the ear papules leishmania were found. The dog developed nodules on each ear after three months, but not on the nose. Leishmania were found in these lesions also.

C. M. W.

da SILVA (Pirajá). **La Leishmaniose cutanée à Bahia.**—*Arch. de Parasitologie.* 1912. Aug. 20. Vol. 15. No. 3. pp. 401–424. 5 plates.

This paper records the discovery of leishmania in eleven cases of cutaneous ulceration in Bahia, Brazil. The type of lesion is well shown in five excellent plates from photographs of the cases; in all there is a striking resemblance to oriental sore. One of the cases is described as having in addition to the cutaneous lesions ulceration in the nose and mouth, but the author did not examine these lesions for leishmania. The disease is evidently the same as that described by CARINI and PARANHOS, LINDENBERG and SPLENDORE. As in oriental sore the cutaneous lesions are limited mostly to the exposed surfaces of the body, but one patient had a sore on the abdomen near the umbilicus. In most the lesions were multiple, some being five centimetres in diameter. The author succeeded in obtaining flagellates in culture on one occasion, but was unable to keep the culture growing.

He attempted to inoculate animals with the disease but without success. Outside Bahia he encountered one case in Rio de Janeiro, where the disease has previously been noted by WERNER (*Kala Azar Bulletin* No. 2, p. 106). The patient was treated with intravenous injections of salvarsan and rapidly recovered. The paper, which is a long one, contains a historical account of the discovery of leishmania in South America and observations made by others on oriental sore.

C. M. W.

GALLI-VALERIO (B.). **Notes de Parasitologie. [iv. Sur un Cas de Bouton d'Orient chez un Persan.]**—*Centralbl. f. Bakt.* 1 Abt. Orig. 1912. July 17. Vol. 65. No. 4–5. pp. 307–308.

The author in this note mentions a case of oriental sore in a Persian. There were two sores on the face from which typical *Leishmania tropica* were obtained. Material from the sore mixed with citrate solution and incubated at 37° C. gave a culture in which the majority of the leishmania were unaltered but a few ovoid flagellate forms appeared. Scrapings from the sore were inoculated into the skin over the frontal region of a *Mus rattus*, which died seven days later. A small ulcer had formed at the site of inoculation and in smears from this the author claims to have found extracellular bodies of the type of *L. tropica*. Cultures and subinoculation of another rat from this sore were unsuccessful. A figure accompanying the paper shows two large macrophages containing leishmania.

C. M. W.

WENYON (C. M.). **Some Remarks on the Successful Inoculation of *Leishmania tropica* to Man.**—*Jl. London School of Trop. Med.* 1912. July. Vol. 1. No. 3. pp. 224–225.

The author inoculated himself by scarification with material obtained from an oriental sore in Aleppo, Syria. A suppurating wound developed and this healed under a scab. Six and a half months later, after he had returned to England, he suffered from fever and some intestinal disturbance, and there developed at the site of inoculation a small red papule. Shortly after two smaller papules appeared near the first. Leishmania were found in these papules. At the time of the original inoculation some material from the sore was placed on the uninjured skin where it was allowed to dry. No sore developed at this spot. **Several deductions may be made from this experiment.—1. *Leishmania tropica* does not pass through uninjured skin. 2. The incubation period of oriental sore may be very long. 3. There was constitutional disturbance at the time of appearance of the papule. 4. The suppuration which occurred after inoculation was not sufficient to destroy the leishmania introduced. 5. It is possible that the purulent discharge from a suppurating tropical sore might be transferred to open wounds by auto-inoculation or by house flies and thus give rise to the disease.**

C. M. W.

MALARIA.

TRANSMISSION.

FERMI (Cl.) & LUMBAU (S.). **Können Anopheles-Mücken auf den Menschen Malaria übertragen, ohne sich durch Besuch von Malariakranken verseucht zu haben? Können dieselben sich die Infektion aus anderen Tieren als dem Menschen holen?** [Can Anophelines transmit Malaria to Man without having infected themselves from Malarial Patients? Can they infect themselves from Animals?]—*Centralbl. f. Bakt.* 1 Abt. Orig. 1912. July 3. Vol. 65. No. 1–3. pp. 105–112.

The experiments of GRASSI, BIGNAMI, and BASTIANELLI show it is improbable that mosquitoes become infected from animals with malarial parasites infective to man.

The authors' experiments were conducted over a period of three years.

(1) They allowed mosquitoes hatched in the laboratory to have their first meal on healthy men.

(2) Young mosquitoes were allowed to feed on animals obtained from malarial districts and then on human beings.

First series of experiments.—88 anophelines which had never previously bitten any man or vertebrate failed to cause malaria in 38 persons.

Second series of experiments.—(a) 26 anophelines which had fed on bats obtained from a malarious district were allowed to feed on 9 persons; no infection was noted. (b) 61 anophelines fed on malarious bats were allowed to bite three days later 21 persons; no infection took place. (c) 18 anophelines, fed on malarious bats and after a period of eight days allowed to bite 8 persons, did not cause infection. (d) 14 anophelines fed on malarious bats and after a period of ten days allowed to feed on 6 persons failed to cause infection.

Third series of experiments.—Anophelines (?number) were fed on infected bats, sparrows, owls, etc., and 10 days later on 26 persons. No infection took place.

Conclusions.—(1) Anophelines which have not fed on malarial patients are incapable of transmitting the disease to man.

(2) Anophelines which have fed only on bats, sparrows, owls, quails, and frogs obtained from malarious districts, cannot infect man with malaria.

J. G. Thomson.

TREATMENT.

WERNER (H.). **Ueber Salvarsan bei Malaria nebst Bemerkungen über Zählungsmethoden von Malariaparasiten.** [Treatment of Malaria with Salvarsan.]—*Estratto dal volume 'In onore del Prof. Angello Celli, nel 25° Anno di Insegnamento'* 1912. pp. 291–297.

The author does not think that in salvarsan for malaria we have yet reached the ideal of a *magna therapia sterilisans* though its

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In the absence of Dr. David Thomson in Panama his place is taken by Dr. J. G. Thomson.

use has led to good results. The results obtained in simple tertian fever were most satisfactory; the rapidity of disappearance of the tertian parasites after an intravenous injection surpassed that obtained by the injection of quinine. The action of the drug is quite specific. The fever vanishes promptly; the gametes disappear as quickly as the schizonts, but the half-grown unsegmented parasites are more resistant. The author proved also the efficacy of salvarsan in vitro.

Altogether he has treated 33 cases. Among these there were six relapses, five of which he ascribes to an insufficient dose. In one case three doses were given before cure was obtained. Salvarsan is just as effective in quinine-resistant malaria as in those cases where there is no resistance; he has been able to cure such cases with the drug. No good results were obtained in the treatment of blackwater fever. The doses, given intravenously, were 0·5 gramme, repeated in 8 to 10 days. The results of the treatment of malignant tertian fever were not so satisfactory.

J. G. T.

JUSTI (K.). **Grundzüge der Malariatherapie.** [The Treatment of Malarial Fever.]—*Münch. Med. Wochenschr.* 1912. July 2. Vol. 59. No. 27. pp. 1505–1506.

The author believes that quinine is the most effective drug in malaria and that salvarsan is of little use. For oral administration quinine hydrochloride is recommended in the form of tabloids without coating, so as to secure rapid absorption, and he advises this method in all cases in which the digestive organs are unaffected. Tannate of quinine in chocolate is used in treating children.

NOCHT's method of giving separate small doses is preferred to that of GOLGI who administers 1 gramme, the latter method being of use only at certain stages of the infection. Quinine administered per rectum is regarded as useless, and subcutaneous injections are not recommended because of the frequency of abscess formation. The author, however, is a decided advocate of intramuscular injections. The form of quinine used was Quin. bimuriat. carbam. (Urea-quinine) in solution; in 2000 injections given intragluteally he observed only two cases of abscess formation, in each instance due to faulty technique. Intravenous injections were not tried.

The author refers to D. THOMSON's work on the leucocytes in malaria (see p. 22). His own researches have shown that the large mononuclears and the lymphocytes are increased in numbers at the expense of the polymorphs, and that during convalescence these gradually return to the normal. Any renewed fall in the number of polymorphs indicates a renewal of the infection, and as a rule is followed by a fresh attack of malarial fever. An absolute cure is only to be expected when the leucocyte index has become normal. As this never occurred in less than three months, this is considered to be the minimum period of treatment indicated. He admits, however, that continued blood examination is not always practicable.

J. G. T.

PROPHYLAXIS.

GIEMSA (G.) Über die Vernichtung der Stechmücken mit Hilfe des Sprayverfahrens. [The Destruction of Mosquitoes by Spraying.]—*Arch. f. Schiffs u. Trop. Hyg.* 1912. Aug. Vol 16. No. 16. pp. 565–567.

The author's fluid for destroying mosquitoes is composed as follows:—

Pyrethrum Tincture	580 grammes
Potassium soap of commerce (as far as possible odourless)	180 grammes
Glycerine	240 grammes

The cost of this fluid in flasks is about 2.38 marks per kilogramme. Purchase of larger amounts lowers the price.

Before application it is mixed with twenty times its volume of water. The fluid is sprayed about the room with a special pump, which is described. One person alone can use it. If a small room is to be sprayed, a hand pump may be employed. This mosquito fluid destroys also plant parasites without destroying the plant.

J. G. T.

WALDOW (Dr.). Chininprophylaxe oder mechanischer Malariaschutz. [Quinine Prophylaxis or Mechanical Protection in Malaria.]—*Arch. f. Schiffs u. Trop. Hyg.* 1912. Aug. Vol. 16. No. 16. pp. 547–555.

The author points out the many difficulties in obtaining protection with mosquito nets and other mechanical devices. Quinine prophylaxis regularly carried out is simple and always possible. The drug is easily carried and enough to last a year with all its packing weighs only 100 or 200 grammes. Quinine also protects against relapses, but a net does not do so. Quinine is not sufficient to prevent infection, but it lessens it and makes it easy to deal with. In conclusion the author advises dwellers in the tropics not to depend on one method, but to use all that are practicable.

J. G. T.

RYLEY (C.). The Value of Quinine as a Malarial Prophylactic.—*Jl. R. Army Med. Corps.* 1912. Sept. Vol. 19. No. 3. pp. 367–368.

Captain Ryley describes an interesting experiment which would appear to show that quinine in doses of five grains daily is not such an efficient prophylactic against malaria as is generally supposed. A white regiment had recently come from England to a malarial district in Hong Kong. To the men of A Company 5 grains of quinine was given daily. To the men of B Company no quinine was given.

Result:—A Company 47 per cent. infected with malaria.
B Company 49 per cent. infected with malaria.

The diagnosis was in every case verified microscopically.

The failure was not due to the deterioration of the quinine, for the same quinine was efficacious in therapeutic doses given to patients in the hospital.

David Thomson.

THOMSON (David). **The Destruction of Crescents: Conclusions regarding the Prevention of Malaria by the Administration of Quinine.**—*Ann. Trop. Med. and Parasit.* 1912. July 31. Series T.M. Vol. 6. No. 2. pp. 223–230.

The author still believes that quinine given in doses of 20 to 30 grains daily will reduce crescents to numbers below one per c.mm., within a period of three weeks. Methylene blue in doses of twelve grains daily has a similar effect. He believes that both these drugs destroy the crescents only indirectly, by destroying the asexual parasites from which they arise. He was unable to find that picric acid, in doses of six grains daily, had any appreciable destructive power either upon the asexual parasites or on the crescents. Soamin, X-rays, and "606" have no direct destructive action upon them, and apparently no direct means of destroying them has so far been discovered.

He disagrees with ZIEMANN, who thinks that the macrogametes are more resistant to quinine than the microgametes, as he found that during the administration of quinine, in doses of thirty grains daily, he was able to get flagellation in the crescents so long as crescents persisted. In one case flagellation was still found after fifteen days and in another after thirteen days. He concludes that the male crescents are quite as resistant to quinine as the female. Quinine and methylene blue, which are the most potent drugs against the asexual malarial germs, are also the best drugs for cleansing the system of crescents; so that a continuous quinine treatment for a month destroys not only the asexual, but also the sexual parasites.

Conclusions regarding quinine prophylaxis.—The author discusses the ideal methods of quininisation of a population, showing what science demands for the certain and rapid extinction of malaria by quinine alone. He finds fault with the continuous administration of five grains daily: (1) Because it is insufficient to prevent infection from mosquitoes; (2) Because it takes a long time to eradicate malaria from the system; (3) Because this dosage tends only to keep the disease latent in the system and may be favourable for the production of crescents.

He gives two alternative ideal methods, in which the amount of quinine taken annually is less in the aggregate than in the five-grain-daily method. He realises that these ideal methods are too exacting to be carried into practice; yet he points out that they are necessary to insure the eradication of malaria, if quinine alone is used.

His "Ideal Method A" is "That every adult person in the population (children in proportion, according to age) should take twenty grains of quinine daily and simultaneously for a period of three weeks, quarterly, *i.e.*, four times a year." He states that the administration of quinine in doses of twenty grains daily for three weeks is almost certain to destroy both the asexual and sexual parasites. After this treatment the person will be non-infective to mosquitoes, and very few patients will have a tendency to relapse. Infective mosquitoes must necessarily become much fewer in number. No quinine is taken during nine months of the year. He thinks it is as practicable a method as the five-grain-daily method.

A more scientific method he calls "Ideal Method B." In this a quarterly blood census would be taken before the administration of the quarterly quinine. Only those who had parasites in their blood would require to take the three weeks' course of quinine, and those with crescents would, if possible, be isolated in mosquito-proof hospitals till non-infective. He concludes by saying that these methods are ideal and, though they cannot be carried out to the letter in practice, should be considered in attempts to form systems of state medicine and sanitation in the tropics; and that the carrying out of these ideals even in part must necessarily do some good. "It is better to understand what is really required by science and, looking at the great difficulties of giving an effectual quinine prophylaxis, a simultaneous though partial mosquito reduction will probably be always required."

D. T.

LUSTIG (Alessandro). **Acht Jahre staatlicher Chininbetrieb in Italien und der Kampf gegen die Malaria.** [An Eight Years Quinine Campaign in Italy.]—*Münch. Med. Wochenschr.* 1912. Sept. 17. Vol. 59. No. 38. pp. 2053–2054.

It is stated that in Italy, before active measures were taken against malaria, the death roll due to the disease was about 15,000 per annum, and it was calculated that the total number of persons who suffered from the disease was about 2,000,000 persons per annum. Legislative methods were introduced in 1900, when the state made it easy for persons suffering from malaria to obtain proper treatment. Landlords and employers were compelled to treat their employees gratis. Prophylaxis was next aimed at, to effect which quinine was sold at the minimum cost and was produced as cheaply as possible. It was prepared by the State hospitals at the military laboratories in Turin and thus distant provinces could obtain regular supplies of the drug. The production of quinine is profitable to the state although it is sold cheaply, and the surplus is used for the free treatment of the poorer classes.

A table is given showing the fall in the death rate corresponding with the increased use of quinine.

J. G. T.

KÜLZ (L.). **Bemerkungen zu: A Treutlein "Verdient die Chininprophylaxe den Vorzug vor dem mechanischen Malariaschutz in den Tropen?"** [The Comparative Value of Mechanical and Quinine Prophylaxis in the Tropics.]—*Arch. f. Schiffs u. Trop. Hyg.* 1912. July. Vol. 16. No. 14. pp. 475–483.

The author discusses the two methods under three headings—Certainty of action; innocuousness; and practicability. He comes to the conclusion that quinine prophylaxis is necessary to fill gaps in mechanical prophylaxis. To the question, Can such doses as are necessary be taken for a long time without harm? he replies that during his own sojourn in the tropics he has taken 600 grams of quinine and has had no illness except one of a surgical nature.

J. G. T.

LABORATORY STUDIES.

SIMPSON (G. C.). **On Haemolysis in Malarial Fever. Preliminary Note.**—*Ann. Trop. Med. and Parasit.* 1912. July 31. Series T.M. Vol. 6. No. 2. pp. 231–233.

In the last eighteen months fifty cases of malaria in the Royal Southern Hospital, Liverpool, have been examined at various stages of the paroxysm and in the intervals, to discover if at any period a haemolytic principle could be discovered in the serum.

The blood was drawn into citrate solution and centrifuged in the pipettes, and the serum was separated from the corpuscles. The corpuscles were washed with normal saline, re-centrifuged, and made into a 5 per cent. emulsion. Non-malarial blood was similarly treated.

The following mixtures were used:—
Malarial corpuscles and malarial serum.
,, ,, ,, normal serum.
,, ,, ,, ,, ,, and malarial serum.
Normal ,, ,, ,, ,, ,, ,, ,,
,, ,, ,, malarial serum.
,, ,, ,, normal serum.

The mixtures were made each in one or two dilutions, incubated at 37° C., and examined after half an hour, one hour, and longer intervals. In no case did the control serum haemolyse the control corpuscles. In only one case did malarial corpuscles appear to be dissolved by control serum, and then only to a very slight extent. In no case did addition of control serum to malarial serum appear to modify the effect of malarial serum alone (Heated malarial serums were not tried). Only seven times out of one hundred observations did the malarial serum exert any haemolytic action, and in two of these it was extremely slight; in the other five cases definite haemolysis took place. Four of the five positive results were obtained in simple tertian fever, and only one in malignant tertian, though most of the cases examined were of the latter type. A very slight result was obtained in a case of blackwater fever.

Positive results appear most likely to be obtained in simple tertian cases at the onset of the paroxysm, when the young sporulating forms are set free in the blood. They are less easy to obtain in malignant tertian cases, in which the sporulation is spread over a larger period of time.

D. T.

THOMSON (David). **Further Observations on the Variations in the Number of Leucocytes and Crescents in Malaria.**—*Ann. Trop. Med. and Parasit.* 1912. July 31. Series T.M. Vol. 6. No. 2. pp. 215–221.

The author believes that the variations in the number of leucocytes, occurring in cases of malaria which have been apparently cured by quinine, are due to small numbers of parasites sporulating, but too scarce to be detected. The variation in the number of leucocytes commences about one to two weeks after the disappearance of the parasites. It is usually a quotidian or irregular variation, occurring about the time of day when the parasites previously sporulated. One seldom got a purely tertian variation in the number of leucocytes even in cases which had shown a pure tertian temperature, because even in apparently pure tertian cases of fever parasites will be found to sporulate between times, not sufficient in number to affect the temperature, but sufficient to cause a variation in the leucocytes.

From twelve experiments in which he injected varying numbers of malarial parasites (dead) subcutaneously, he was led to believe that a subcutaneous injection of ten to twenty million malignant tertian parasites caused a leucocytosis, whereas thirty to forty million and upwards caused a leucopenic effect as in a malarial paroxysm.

During a malarial paroxysm there is, as a rule, a leucopenia. Some observers have recorded a transient leucocytosis lasting about 20 minutes at the very commencement of the rigor. He has observed this only on two occasions, and thinks that it might be explained by the supposition that a very few parasites sporulate before the majority, and these few cause the temporary leucocytosis, which soon becomes a leucopenia when the majority sporulate. In cases of comatose malaria one frequently finds a marked leucocytosis during the fever paroxysm. He is unable to explain this exception.

Variation in the number of Crescents.—The author publishes a chart showing a tertian outburst of crescents into the peripheral circulation in a pure tertian case of *P. falciparum*. This chart also shows how quinine, in doses of thirty grains daily, gradually reduces the number of crescents to zero.

D. T.

CULTIVATION.

i. BASS (C. C.). **Successful Cultivation of Malarial Plasmodia.**—*Jl. Amer. Med. Assoc.* 1912. Sept. 21. Vol. 59. No. 12 (Pt. 1). p. 936.

ii. BASS (C. C.) and JOHNS (F. M.). **The Cultivation of Malarial Plasmodia (*Plasmodium vivax* and *Plasmodium falciparum*) in vitro.**—*Jl. Exper. Med.* 1912. Oct. 1. Vol. 16. No. 4. pp. 567–579.

The authors (ii) describe their technique for the cultivation of malarial plasmodia. Blood is drawn from the patient's arm into a sterile glass syringe. Ten cc. of this are expelled into a defibrinating tube which contains one tenth of a cc. of a 50 per cent. solution of dextrose (Merck's). Gentle stirring with a glass rod is employed to defibrinate and the mixture is transferred to culture tubes, so as to form a column two inches deep. When the cells and parasites have settled there is half an inch to an inch of serum above the surface of the deposit. If the column is less than half an inch, the parasites often die before segmentation occurs. The plasmodia live and develop on the surface of the precipitated cells in a layer varying in depth from one fifteenth to one twentieth of an inch. All parasites below this die in from two to twenty-four hours. The incubation temperature should not be less than 40° C., and strict anaerobic precautions are necessary. The above technique is used to obtain the first generation of parasites.

If more than one generation are to be cultivated, the leucocytes must be removed by centrifugation. Culture tubes are prepared containing serum to a depth of at least half an inch, and red cells are planted at the bottom of these. In these leucocyte-free cultures it is possible, if fresh cells are planted at a suitable time, to obtain several generations of malarial parasites. The plasmodia develop and segment, and most of the merozoites enter new red blood corpuscles. The transplantation should be done within four or six hours of the time of maximum segmentation and, therefore, approximately every 48 hours for tertian and aestivo-autumnal parasites.

Serum from different individuals is not equally serviceable for the cultivation of malarial plasmodia. Leucocytes do not destroy the parasites as long as they are inside the red cells. Dextrose or maltose seem necessary. Blood drawn one or two hours after the patient had eaten a full meal was more serviceable for culture media than that drawn after long fasting. The most rapid growth is obtained at 41° C., and at this temperature aestivo-autumnal parasites will develop from the smallest rings and segment in about thirty hours. Calcium salts when added to cultures of aestivo-autumnal plasmodia caused haemolysis of the infected red blood corpuscles; from this it would seem that the presence of excess of calcium in the food or drinking water of a patient might possibly bring about haemoglobinuria.

The authors think that dextrose renders the red blood corpuscles less permeable to the destructive elements in the serum, and so the parasites are protected. Forms suggesting parthenogenesis have been observed in the cultures.

Positive cultures have been obtained from 29 cases of aestivo-autumnal malaria, from six cases of tertian malaria, and from one case of quartan. They have been carried on as far as four generations and, with proper attention to technique, could probably be continued indefinitely.

Summary.—" The asexual cycle of *Plasmodium vivax* and *Plasmodium falciparum* has been cultivated *in vitro* in human blood. The parasites have been grown also in red blood cells in the presence of Locke's solution, free of calcium chlorid and in the presence of ascitic fluid.

"The parasites grow within red blood cells and there is no evidence that they can be grown outside of these cells.

"The parasites are destroyed in a very few minutes *in vitro* by normal human serum or by all modifications of serum that we have tested. This fact, together with numerous observations of parasites in all stages of growth apparently within red cells, renders untenable the idea of extra-corpuscular development.

"Leucocytes phagocytize and destroy malarial plasmodia growing *in vitro* only when the parasites escape from their red blood cell capsule or when the latter is perforated or becomes permeable.

"Successive generations of *Plasmodium vivax* and *Plasmodium falciparum* have been cultivated *in vitro* by removing the leucocytes from the culture and by transplanting to fresh red blood cells and serum at proper intervals.

"The asexual cycle of *Plasmodium vivax* and *Plasmodium falciparum* cultivated *in vitro* does not differ from the same cycle growing *in vivo*.

"The sexual cycle has not been cultivated, though we have obtained some evidence of the possibility of its accomplishment.

"There can no longer be any doubt that *Plasmodium vivax* and *Plasmodium falciparum* are separate and distinct species. When grown in an identical culture medium and under exactly the same conditions they remain distinct.

"In twenty-nine cultures of aestivo-autumnal parasites many forms and sizes have been observed, so that evidence is supplied of the occurrence of different varieties of aestivo-autumnal malarial plasmodia. The so called tertian aestivo-autumnal variety may be seen at the proper stage in all cultures grown from merozoites.

"The form and appearance of the same culture of plasmodia may vary greatly under different conditions which are not necessarily destructive to the parasites. Their generation period may vary from thirty hours (aestivo-autumnal) to four days (tertian), as a result of variation in the temperature at which they were cultivated. Sexual parasites grow in the cultures and are more resistant to unfavourable conditions than schizonts, often living several days after the latter die out.

"Forms suggesting parthenogenesis have been observed."

J. G. T.

MISCELLANEOUS.

BISDOM (Wijckerheld). **Einige Bemerkungen über die Malaria im Indischen Heer in den Jahren 1895–1909.** [Malaria in the Army in the Dutch Indies.]—*Janus.* 1912. July-Aug. Vol. 17. No. 7–8. pp. 400–409.

By means of a chart the author shows the remarkable diminution in the occurence of malaria both in Europeans and natives of the Netherland Indies. In 1886, 80 per cent. of the Europeans were affected, but in 1909 only 20 per cent. In natives in 1887 the percentage was 71; in 1909 this had fallen to 17. Since 1909 the fall has been rapid. In the same chart is given a graph of the percentage of beri-beri cases both in natives and Europeans, and this shows a similar falling off during these years. Many of the convalescent hospitals are now closed because of the scarcity of patients, and the chief reason for this improvement in health is the diminution of the cases of malaria. In 1885 the deaths due to malaria were 0·6 per cent.; in 1909, 0·07 per cent. The lessened death rate corresponds to the fall of cases of malaria and beri-beri. A table is given of the total deaths and also the deaths from malaria and beri-beri.

The cause of the great improvement in the general health is given as: improvement in hygenic surroundings; lessened use of alcohol; day shelters for soldiers; quinine administration. The author does not think that gauze protection in the camps of the soldiers was very effective because the windows and doors were kept open; so that this could scarcely be assigned as the cause of the fall in malaria. He places the use of quinine as a prophylactic first. Quinine bisulphate is given in the form of sugar-coated tablets, made up in doses of 0·2 and 0·4 gram. These resist the climate better than the ordinary ones. At first they were expensive, but recently have been greatly cheapened.

The author in conclusion says that probably the use of quinine as a prophylactic and in treatment has been the most important factor in diminishing the incidence of malaria in the Netherland Indies.

J. G. T.

PRAMPOLINI (Bruto). **Contributo allo Studio dell Infezione Malarica in rapporto agli Interventi Operativi ed ai Traumi.** [Relation of an Attack of Malaria to Operations or Trauma.]—*Policlinico*, sez. prat. 1912. July 7. Vol. 19. No. 28. pp. 1009–1012.

The author points out that when the resistance of a patient is temporarily lowered by operation or trauma an attack of malarial fever, due to parasites lying latent in the body, may occur. Since he became head of the surgical department of the hospital at Cavarzere (Italy), it has often happened that after operations which were perfectly aseptic, *e.g.*, hernia, a rise of temperature occurred as high as 40° C. The presence of an enlarged spleen and, in some cases, of plasmodia in the blood enabled him to explain the temperature, which was intermittent, as due to malaria, and quinine always reduced this.

Similar attacks of fever were noted after fractures, dislocations, and severe contusions, and the author points out that even in the absence of a previous history of malarial fever in some cases he found the spleen enlarged and parasites present in the blood.

An account of nine cases is given. Five of these were operation cases, while four were accidents, in two of which operative intervention was necessary.

J. G. T.

POZZILLI (Pericle). **Sindrome Cerebellare Malarica.** [Cerebellar Symptoms occurring in Malaria.]—*Policlinico*, sez. prat. 1912. July 7. Vol. 19. No. 28. pp. 1012–1015.

The author points out that it is only during recent years that the nervous symptoms in malaria have been exactly described. He gives a detailed description of a case studied by him in Ferrara (Italy), which in his opinion presented a complete picture of the cerebral symptoms of acute malaria.

The patient was a boy aged 4 years. The parasites were of the aestivo-autumnal type and fairly numerous in the blood. Two crescents were found. The spleen was enlarged and anaemia was marked. The following phenomena were observed: disturbance of equilibrium; face expressionless; tendon reflexes exaggerated; intention tremor; scanning speech. Babinsky's sign was absent. There were no trophic changes, no Rombergism; sensibility was normal.

The author points out that the symptoms in this case indicated involvement of the cerebellum, as evidenced by the disturbance of equilibrium, etc. He thinks the presence of parasites in the cerebellar capillaries does not necessarily produce ataxia, but that the theory of MARCHIAFAVA, CELLI and BIGNAMI, namely that numerous punctiform haemorrhages are present, is more acceptable although it does not explain all cases. MARCHIAFAVA and CELLI consider these small haemorrhages to be the cause of cerebral paralysis which does not give way promptly to treatment. SCHUPFER demonstrated them in the grey matter of the cerebellum. BASTIANELLI found at a necropsy slight atrophy of the cerebellum with remarkable diminution of Purkinje's cells.

Though in some cases of malaria the nervous symptoms are explained exclusively or partly by small haemorrhages into the cerebellar substance, malarial toxins may play a part and may even participate in the production of the haemorrhages. The author supposes that the vascular and perivascular lesions undergo sclerotic changes and that these become more marked in consequence of other disturbances, such as embolism, thrombosis and softening.

J. G. T.

SEMPLE (David). **Some Remarks on a Criticism of Quinine Injection and Tetanus.**—*Jl. R. Army Med. Corps.* 1912. Sept. Vol. 19. No. 3. pp. 323–333.

In this article Sir David Semple defends himself against a criticism made by Major F. J. PALMER R.A.M.C. on his publication entitled "The Relation of Tetanus to the Hypodermic or Intramuscular Injection of Quinine." Semple quotes several paragraphs of the criticism, showing that his critic has failed to understand many of his experiments.

D. T.

LEGRAIN (Emile). **L'Étiologie des Fièvres intermittentes.**—*Janus.* 1912. July-Aug. Vol. 17. No. 7–8. pp. 410–416.

The author appears to believe that the condition designated malaria is not caused by a protozoon, but is either a common gastro-intestinal infection or caused by a micrococcus which is a filter passer. Those interested should consult his paper.

A. G. B.

MALARIA IN ANIMALS.

LEGER (M.) et BOUILLIEZ (M.). **Sur un Plasmodium des Singes. Passages par Espèces variées. Action pathogène.** *Compt. Rend. Soc. Biol.* 1912. Aug. 2. Vol. 73. No. 28. pp. 310–313.

The authors announce the discovery of a Plasmodium in the heart blood of a monkey (*Macacus cynomolgus*) which died in their animal house a week after arrival. They were able to carry this haematozoon through seven monkeys, and the rapid death of the animals showed that it was extremely pathogenic. The animals as a rule lived from 7 to 14 days after inoculation and the parasites were very numerous in the peripheral circulation. This parasite resembles *Plasmodium inui* (Halberstaedter and Prowazek 1907) in its schizogony and in the absence of increase in size of the infected red blood corpuscles. Twelve to sixteen merozoites are formed. Sometimes the disease is more chronic; they have a monkey alive which has been infected for three months. The parasite was found to be pathogenic to several other species, namely *M. sinicus*, *Papio anubis*, *M. rhesus* and *Cercopithecus patas*; *Cercocebus fuliginosus*, the chimpanzee, and the maki of Madagascar proved refractory. The authors at present do not think there is enough evidence to form a new species, since the pathogenicity may have been caused by the lowered resistance of the monkeys, which were kept in a cage in Paris. They will make inoculation experiments with other monkeys.

J. G. T.

SERGENT (Etienne et Edmond). **Paludisme des Oiseaux (*Plasmodium relictum*). L'Infection peut se faire par simple frottis du Thorax du Moustique sur la Peau.**—*Compt. Rend. Soc. Biol.* 1912. July 12. Vol. 73. No. 25. p. 36.

The authors were able to infect four out of ten canaries with bird malaria by simply rubbing the crushed thoraces of infected mosquitos into a scratch on the exposed skin. The incubation period was ten to twelve days. All the control canaries (100 per cent.) bitten by infected mosquitos contracted the disease, and the incubation period in them was shorter—viz.: six to nine days.

J. G. T.

MOLDOVAN (J.). **Ueber die Immunitätsverhältnisse bei der Vogelmalaria.** [Immunity in Bird-Malaria.]—*Centralbl. f. Bakt.* 1 Abt. Orig. 1912. Aug. 24. Vol. 66. No. 1. pp. 105–110.

Plasmodium praecox, the author writes, is very closely allied to the parasite which causes malaria in man. As long as a bird is infected with parasites it appears to be resistant to a new infection, but the moment it has recovered the power of resistance is lost. He tried to find out if there was an antibody in the blood. (1) He took the serum of a chronically infected bird and kept it in contact with the injection material, but no protective action resulted; (2) He looked for complement fixation phenomena in the blood of sick canaries and found none; (3) An animal which had been ill for a long time and had recovered was not immune to a new infection.

The author shows that a canary infected with *Plasmodium praecox* may in a short time completely recover; in the majority of cases, however, the disease proceeds to a characteristic chronic infection. By the injection of a chronic case with the blood of a different animal relapses were obtained after an interval of about eight days.

The author gives a full set of experiments and a table too long for insertion; those interested are referred to the original article.

J. G. T.

BLACKWATER FEVER.

ACHARD (Ch.) and SAINT-GIRONS (F.). **Fièvre Bilieuse Hémoglobinurique. Remarques sur la Pathogénie de l'Hémoglobinurie.**—*Bull. et Mém. Soc. Méd. des Hôpit. de Paris.* 1912. June 6. ser. 3. Vol. 28. No. 19. pp. 749–758.

The authors give a very full description of a case of blackwater fever with biliary symptoms occurring in Paris. The haemoglobinuria did not occur till the patient entered hospital.

A lady, age 37, entered hospital complaining of pain in the region of the appendix. She had lived several years on the West Coast of Africa (Gulf of Guinea) and also in the Sudan, and gave a history of several attacks of malaria. On her admission her temperature was 38·2° C., and she received half a gramme of quinine with an equal quantity of antipyrin. Next day a dose of 1 gramme of quinine was given. On the following morning marked jaundice was noticed and a very intense haemoglobinuria. Anaemia was profound. In spite of treatment the patient succumbed after a short illness of about five days. No autopsy was performed. Examination of the patient's blood during the attack of haemoglobinuria showed no haemolytic power in the serum. The authors describe their technique. The blood counts showed a severe anaemia. The leucocytes rose gradually during the five days of illness from 9,200 per cmm to 60,800 per cmm. No parasites were found in the blood. The serum was examined for urea on two occasions. It contained 0·53 grammes per 1,000 on the first examination, and 2·04 gramme per 1,000 on the second. The urine contained debris of red blood corpuscles and haemoglobin. The vomit contained bile and urea (1·50 grammes to 1·27 grammes per 1,000).

The authors allude to the classical opinion that haemoglobinuric fever is due to the presence of haemoglobin free in the serum. This opinion is based on the observations of BOUFFARD and ZIEMANN, who found haemolytic power in the serum and abundance of haemoglobin in the urine without notable sediment of red blood corpuscles. In the authors' own case the serum showed oxyhaemoglobin in one examination on the first day, but on the other hand the plasma collected in sodium oxalate solution had no haemolytic power, nor had the serum either for the patient's own corpuscles or for the corpuscles of two normal individuals. Coagulation was normal. They compare this case with one of typhoid fever, which developed haemoglobinuria. At the post-mortem renal haemorrhages were found. The urine contained haemoglobin and also debris of red blood corpuscles, but the serum had no haemolytic action.

After a comparison of this and their blackwater case they conclude that the haemolytic action is in the urinary tract or in the kidney.

J. G. T.

CARDAMATIS (Jean P.) **Les Hémoglobinuries chez les Paludiques commes celles occasionnées par la Consommation des Fèves fraîches peuvent-elles être des Phénomènes de l'Anaphylaxie ?**—*Bull. Soc. Path. Exot.* 1912. July. Vol. 5. No. 7. pp. 521–523.

The author believes that haemoglobinuria is not a disease but rather a symptom, perhaps a phenomenon of anaphylaxis. Quinine is not an albuminoid substance, and would appear not to be able to produce this phenomenon; it combines however with the albumen of the stomach, and is absorbed as an albuminate of quinine. On this account and perhaps also owing to digestive disorders quinine, entering into the system of a malarial subject through the stomach, might be able under certain conditions still unknown, to act as an antigen. This antigen combined with the malarial toxin produces antibodies which provoke a sensitiveness to quinine in the malarial subject, so that every further dose of quinine produces the phenomenon of anaphylaxis, perhaps on account of its combining with the antibodies produced or perhaps by its transformation into a hypertoxic material.

Although the clinical symptoms of an anaphylactic attack accord only partially with those of an attack of blackwater, yet no one can explain the latter any better than by the supposition that it is similar to the haemoglobinuria following upon the consumption of the pods, leaves or flowers of fresh beans. The anaphylactic phenomena produced by green beans are probably due to the introduction into the system, on account of faulty digestion, of a vegetable albuminoid, foreign to the system, which acting as an antigen, *i.e.*, as toxic material, excites the formation of antibodies, and following upon this the condition of anaphylaxis.

D. T.

LEISHMAN (Wm.). **Cell-Inclusions in the Blood in Blackwater Fever.** Second Note.—*Jl. R. Army Med. Corps.* 1912. Aug. Vol. 19. No. 2. pp. 151–156, with 4 figs.

In the *Journal of the Royal Army Medical Corps* (Vol. 18, No. 5, May 1912, pp. 493-504) Sir Wm. Leishman recorded the occurrence of cell-inclusions in certain of the large mononuclear cells found in peripheral blood films of a case of blackwater fever which occurred in Uganda. He suggested the possibility of these bodies being parasites of a chlamydozoal nature. He now describes the occurrence of similar bodies in the peripheral blood films of two further cases of blackwater fever, which he records as "Case 2" and "Case 3" respectively, that dealt with in his first note being alluded to as "Case 1."

Case 2 was a native boy suffering from blackwater fever in one of the outlying mines of the Rand, S. Africa. The blood film showed an intense degree of leucocytosis, but he had no record of the actual blood count. The differential count showed 2·0 per cent. of "chrome cells." Very large numbers of nucleated red cells were present, in the proportion of one megaloblast and four normoblasts to every 100 white cells. He states that "this blood picture makes it evident that the bone marrow in this case was gravely affected, a sign-post which might possibly indicate a useful path of exploration in the future." The cell inclusions, described in 'Case 1' were found to be plentiful in this film. They occurred only in the endothelial type of cell, and none was found in any of the ordinary leucocytes found in normal blood. The type of inclusion most commonly met with was that figured in Nos. 1 to 4 of the plate. They stained a varying depth of pink or red, and were almost invariably clear cut and circular in contour. The forms were mostly homogeneous. The ring forms which he described in Case 1 were scarce in this case, and he was unable to find any of the large forms found in Case 1.

He states that he had great difficulty in deciding whether these inclusions might not be altered or fragmented red cells which had undergone phagocytosis, but he still considers that the inclusions are not explicable on this ground. In Case 2 as in Case 1, he found that many of the mononucleated cells contained numerous granules in the cytoplasm, which he was unable to refer to any of the types of EHRLICH or to the azure granules of normal lymphocytes or hyalines. These granules were deep red, larger than neutrophile granules, but not nearly so large as coarse eosinophile or basophile granules. Their distribution in the cell cytoplasm was scanty. These granules were never seen in polynuclears or eosinophiles. He suggests that they may possibly represent a stage in the history of a chlamydozoan.

In this case and in Case 3 he found certain curious cells which he had never previously encountered, either in blood-films or in plates illustrating cytological work. These cells were not uncommon and could be readily distinguished from all others by the deep chromatin tint of the whole cell; they were of the size of ordinary polynuclears and their nuclei were sometimes of that type, sometimes mononuclear. The cytoplasm appeared more or less completely filled with material which showed the chromatin reaction and, in almost every instance, the red colour was most intense at the periphery, giving the cell an appearance of being capsulated. In other instances the partial disruption of the cell permitted it to be seen that the red-staining material consisted of a mass of chromatin bodies, sometimes of quite irregular shape and size, but occasionally showing a tendency to ring form (see accompanying plate, figs. 1 and 2). He calls these cells "Chrome Cells."

Case 3.—Two blood films from a case of blackwater fever described by ROSS, THOMSON and SIMPSON in the *Annals of Tropical Medicine and Parasitology* (Vol. 4, p. 308, 1910). These films were taken at the commencement of the third attack of fever, during which there was no haemoglobinuria and no malaria, parasites were found. On the day on which these films were taken the leucocyte count was 3,000 per c.mm. The differential count showed 0·5 per cent. of "Chrome Cells." These are shown in figs. 3 and 4. The one depicted in fig. 4 has ruptured and shows chromatin rings, which the author thinks are identical with the cell inclusions which he has been describing.

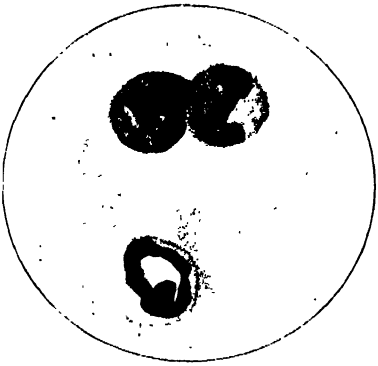


FIG. 1.

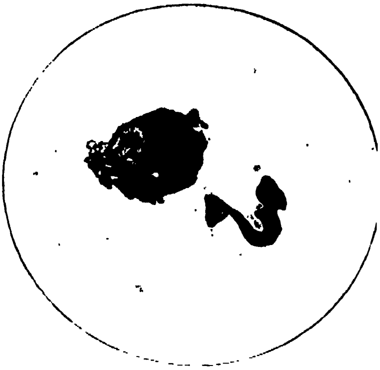


FIG. 2.

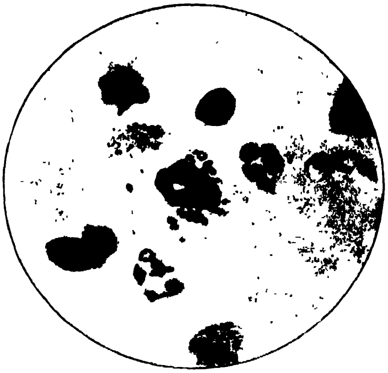


FIG. 3.

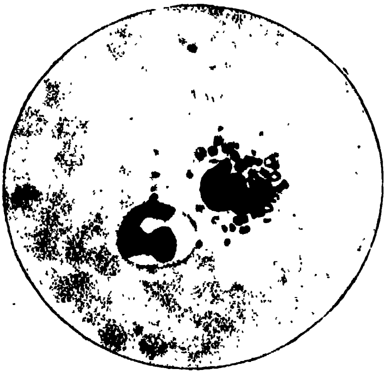


FIG. 4.

To illustrate Sir WM. LEISHMAN'S paper on "Cell-inclusions in the Blood in Blackwater Fever."

[Reproduced by permission from the *Journal of the Royal Army Medical Corps.*]

He thinks that the cell inclusions described by LOW in some fever cases from Borneo and in the blood of some pellagrins are not identical with those found by him in these three cases, but states that his cell inclusions are identical with those found in the blood film of a case of chronic malaria from Nigeria shown to him by Major HARRISON. This case had no history of blackwater fever, but the author thinks it significant that the fever was contracted in a blackwater fever country.

D. T.

The Occurrence of Blackwater Fever in the Nyasaland Protectorate, Northern Nigeria and Sierra Leone. [From the Reports of Medical Officers sent during June, July, and August, 1912, to the Secretary of State for the Colonies].

From Nyasaland nine cases of blackwater fever are reported by Drs. J. B. DAVEY, R. BURY, A. G. ELDRED, and H. S. STANNUS. Several of the patients gave a definite history of previous malarial attacks, and two are reported to have used quinine at irregular intervals.

From Northern Nigeria Dr. F. MANNING, Acting P.M.O. reports eight cases, and of these three only stated they were regular in the use of quinine; he thinks however there is some doubt whether they really did take the regulation daily 5 grain dose recommended by the authorities. In this report is given the seasonal incidence of this malady from the year 1898 to 1911.

From Sierra Leone Dr. R. M. FORDE reports seven cases. All, as far as he can remember, occurred in persons of some length of service in West Africa, who never took quinine regularly as a prophylactic. Dr. Forde has always noted two well-marked types: (*a*) a severe class of case, with rapid onset; (*b*) a milder class of case, with slower onset, no relapses, and with rapid recovery.

J. G. T.

RELAPSING FEVER.

TRANSMISSION.

NICOLLE (C.), BLAIZOT (L.) et CONSEIL (E.). i. **Etiologie de la Fièvre Récurrente. Son Mode de Transmission par le Pou. ii. Conditions de Transmission de la Fièvre Récurrente par le Pou.** —*Compt. Rend. de l'Acad. Sci.* 1912. June 10. Vol. 154. No. 24. pp. 1636–1638: and Aug. 26. Vol. 155. No. 9. pp. 481–484: also (i) in *Arch. Inst. Pasteur Tunis.* 1912. No. 3. pp. 110–112.

Although various investigators have been struck by the analogies between relapsing and typhus fever and from an epidemiological point of view have arrived at the opinion that the louse is responsible for the transmission of relapsing fever, NICOLLE, BLAIZOT and CONSEIL are the first to succeed in proving experimentally the truth of this hypothesis.

The Algerian strain of relapsing fever was employed throughout these experiments and the authors first attempted to infect both monkeys (*Macacus*) and men by the bites of body-lice (*Pediculus vestimenti*) that had previously fed on infected blood (*i.e.* in which spirochaetes were present). Although numerous experiments were made, and in one case no less than 4,707 infected lice were allowed to feed on one man, none of the men or animals ever became infected with spirochaetosis or showed any rise in temperature. The monkeys used in these experiments were subsequently proved to be susceptible to the disease by the inoculation of small quantites of infected blood. In every case the lice were merely allowed to feed on the animal and then removed, and the results clearly show that under these conditions the bite of infected lice is innocuous.

On examination of the crushed contents of lice that had just fed on an infected animal numerous living spirochaetes were found. When the lice were kept at a temperature of 28° C. these spirochaetes disappeared after one day, but often reappeared, in one series between the 6th and 8th day and in two other series between the 11th and 12th day. An eighth of the lice employed, both the body louse and *P. capitis* (the head louse), was found to show spirochaetes on the ninth day, and their virulence was proved by inoculating them into monkeys, which invariably became infected. Moreover, the authors found that when an emulsion of two body lice that had fed on an infected monkey nine days previously was rubbed on the slightly excoriated surface of the skin of a man, he became infected with relapsing fever five days later. In another case, in which an emulsion of an infected louse was placed on the conjunctiva, the patient showed spirochaetes after an incubation period of seven days. Both these cases were cured on the first day of infection by an injection of salvarsan.

The method in which infected lice may transmit Algerian relapsing fever is as follows:—When a man is bitten by a louse the irritation produced usually causes him to scratch that part of the skin, and thus the parasite is often crushed on to the skin and its contents get on to the finger-nails. The excoriation of the skin produced by the scratching is sufficient to allow the entry of the spirochaetes present in the body of the louse and thus infection occurs. The mere bite of the louse, however, is innocuous, as shown in the above described experiments.

Finally a most important fact, also demonstrated by these authors, is the hereditary transmission of infection in the body-louse, which proves that this insect is a true intermediate host for the spirochaete.

Eggs were laid by the lice 12-20 days after they had fed on an infected monkey. These eggs were kept in a moist chamber at 28° C. and commenced to hatch out 17 days later. Some of these young lice and also some eggs were inoculated into a monkey; 10 days later this animal became infected with spirochaetosis.

ii. This paper contains some important additions. The authors attempted to determine how long the lice remained infected and also when the spirochaetes finally disappeared from the insect's body. It was found that after an infective feed the spirochaetes never reappeared in the lice earlier than the eighth day; that they persisted as late as the nineteenth day, but never later. A monkey inoculated with 24 lice on the twentieth day did not become infected. [The authors leave one to assume that for the production of infection the presence of spirochaetes, *as such*, in the body of the lice is necessary, but this is not stated.]

As the results of experiments it was found that of 165 lice (♂ and ♀) 29, or 17·57 per cent., became infective, proportionately four times as many females as males; the former therefore seem to be more susceptible. A few experiments with the head louse gave approximately similar results to the above, so that the species of Pediculus employed seems to be unimportant.

The spirochaetes have never been seen in any other site than the coelomic fluid of the louse. They were never found in the eggs dissected out of the ovaries of infected lice. The contents of the digestive tube are uninfective and also the faeces, as tested by inoculations into monkeys.

Another example is given of the innocuity of the mere bites of infected lice, for one subject allowed himself to be bitten 6,515 times by lice that had fed on an infected monkey. Of these 1,918 were between the eighth and nineteenth days, when the coelomic fluid of many of them was swarming with spirochaetes, which on the slightest excoriation were capable of producing infection.

The hereditary transmission of the infection is now considered to be unusual, for the authors have failed to repeat this in two successive cases, when large numbers of young lice from infected parents were inoculated into monkeys.

Attempts were made to transmit the spirochaete by means of *Ornithodorous savignyi* obtained in Tripoli, but neither the bites of ticks that had fed on infected animals, nor the inoculation of the tick contents into monkeys was followed by infection.

[These results are of the highest importance, for although many doctors have suggested that lice, especially the body-louse, *P. vestimenti,* were responsible for the transmission of various relapsing fevers, previously all attempts to obtain experimental evidence had failed. We now have an excellent example of what may be termed the "contaminative" mode of infection by the intermediate host and it is interesting to compare it with the transmission of *S. duttoni* by *Ornithodorus moubata.* In this case both LEISHMAN and HINDLE have shown that the tick produces infection only as a result of the entrance of the infective faeces into the wound caused by the tick's bite. In both cases, therefore, the contaminative mode of infection takes place and thus the transmission of these two different varieties of spirochaetes is essentially the same.

After the results of LEISHMAN, BALFOUR, and HINDLE, on the changes undergone by blood spirochaetes in the intermediate host, it is not to be expected that spirochaetes, as such, would be found in the eggs from the ovary. The intracellular coccoid bodies are never mentioned and do not seem to have been looked for. The inoculations of this phase are always somewhat uncertain and, consequently, the negative results obtained by the inoculation of eggs from the ovary of an infected louse are inconclusive.]

Edw. Hindle.

CHEMOTHERAPY.

HERMANT (Dr.). **Note sur la Fièvre Récurrente dans la Province de Nghê-An.**—*Bull. Soc. Méd. Chir. de l'Indochine.* 1912. Vol. 3. No. 7. pp. 418–426.

MOUZELS (P.) et NGUYÊN-XUAN-MAI. **Note sur 373 Cas de Fièvre Récurrente traités au Lazaret de Hanoi par le 606 au Cours de l'Année 1912 du 1er Janvier au 1er Juin.**—*Ibid.* pp. 427–435.

LEGENDRE (J.). **Traitement de la Fièvre Récurrente par l'Arsénobenzol.**—*Bull. Soc. Path. Exot.* 1912. June. Vol. 5. No. 6. pp. 339–342.

All these papers describe the result of treating the relapsing fever of Tonkin with arsenobenzol (salvarsan), and in each case the authors agree that this drug is an excellent specific for the disease.

LEGENDRE gives the results of treating 8 cases with 0·2-0·3 gms. arsenobenzol; in every patient the spirochaetes disappeared within 24 hours and no relapse occurred.

HERMANT treated 51 patients by means of intravenous injections of 0·12-0·20 gms. of arsenobenzol and in each case the spirochaetes disappeared after a few hours and there was no relapse. One patient received the drug subcutaneously, and an abscess formed at the site of injection; this method therefore was abandoned. In four other cases the infection was followed by the death of the patients, but three of these were old men aged respectively 60, 63 and 70 years, for whom there was no hope of recovery, whilst the other was an anaemic woman 36 years old. His supply of arsenobenzol being exhausted, Dr. HERMANT injected 9 patients with atoxyl, but the drug merely produced an exaggeration of the fever.

The most important results are those of **Mouzels** and **Nguyen-Xuan-Mai**. Forty-one patients were treated by intra-rectal injections of arsenobenzol; the others received the drug intravenously. The intra-rectal method was found to be both inconvenient and less prompt in its action; moreover, as double the dose is necessary, it is more expensive. Its method of application is as follows:—The contents of the rectum are washed out by means of an injection of 500 cc. of boiled water, and 0·20-0·40 gms. of the drug, dissolved in the same way as for intravenous injection, are introduced into the rectum as high up as it has been emptied. The method is recommended only for children and patients in whom it is difficult to find the veins. Of 332 patients treated by intravenous injections (usually 0·20 gms.) only 6 relapsed and these were all cured by a second injection. The administration of the drug is usually followed by a rise in temperature and an aggravation in the general state, but after 8-18 hours these symptoms disappear and recovery is so rapid that within 4-5 days the patient is quite well.

In 24 cases, about the 12th day, they observed a febrile relapse without the appearance of spirochaetes. This so-called "Rebound Fever" is not affected by '606.' It usually lasts only 24 hours, but occasionally as long as three days.

Although 22 of the patients died in the hospital, in only four cases was death due to the relapsing fever and in these the state of health was so precarious that all died within two or three days of entrance. Spirochaetes were not present in the circulation at the time of death. Before '606' was employed the mortality from the disease was 4·16 per cent. in this hospital, but since the introduction of this specific it has been only 1·07 per cent. In addition to diminishing the mortality it lowers the duration in hospital by more than two-thirds and thus is very economical.

All these authors agree as to the excellent results obtained by the use of "606" as a specific for the relapsing fever of Tonkin; intravenous injections are found to be the most satisfactory. The dose is generally about 0·20 gms. for an adult Annamite.

To his clinical notes Dr. Hermant adds some observations on the epidemiology of the fever and comes to the conclusion that the body-louse is probably responsible for its transmission.

E. H.

Conseil (E.) et Bienassis (E.). **Traitement de la Fièvre Récurrente par le Néosalvarsan d'Ehrlich.**—*Bull. Soc. Path. Exot.* 1912. July. Vol. 5. No. 7. pp. 476–481. With 3 charts.

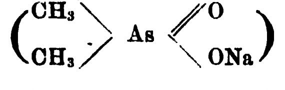
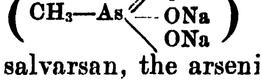
Although these authors obtained good results by the treatment of North African relapsing fever with salvarsan (intravenous injections of 0·008 gms. per kilo.) and cured ten cases out of eleven with one injection, the dangers of the treatment caused them to try other compounds. As a result of the treatment of nine cases with neosalvarsan they recommend this medicament. The temperature charts of three of these cases are given. In addition to its perfect solubility and the ease with which it can be manipulated it is found to be much less toxic than arsenobenzol (salvarsan); for in one case the injection of 1·45 gms.

of neosalvarsan into a patient weighing 60 kilos (·025 gms. per kilo.) did not produce any ill effects. This inferior toxicity permits the use of this new compound in severe cases of relapsing fever when the state of the liver prohibits the use of the older specific. Finally, the authors are of the opinion that the injection of neosalvarsan is followed by a much less severe reaction than that which follows the injection of salvarsan.

E. H.

CASTELLI (G.). **Chemotherapeutische Versuche über die Wirkung des Kakodyl und Arrhenal bei experimentellen Spirillen- und Trypanosomenerkrankungen.** [Chemotherapeutical Study of the Action of Cacodyl and Arrhenal on Experimental Infections of Spirochaetes and Trypanosomes.]—*Arch. f. Schiffs u. Trop. Hyg.* 1912. Sept. Vol. 16. No. 18. pp. 605–619.

The author finds that sodium cacodylate and arrhenal are without any effect on infections of *Spirochaeta recurrentis* in mice, *S. gallinarum* in fowls, and *Trypanosoma brucei* in mice. Moreover, these compounds had no effect on scrotal infections of *Treponema pallidum* and *T. pertenue* in rabbits. Even when the maximum doses were administered, both intravenously and intramuscularly, no parasiticidal action was noticed. Castelli concludes, therefore, that sodium cacodylate and arrhenal are of no use for the treatment of spirochaetal infections.

Comparing the effect of salvarsan, which is well known to possess very strong parasiticidal properties in the above infections, the author accounts for the different properties of these arsenical compounds by their respective chemical constitutions. In both sodium cacodylate  $\left(\begin{array}{l}CH_3\\CH_3\end{array}\!> As <\!\begin{array}{l}O\\ONa\end{array}\right)$ and arrhenal  $\left(CH_3—As\begin{array}{l}O\\ONa\\ONa\end{array}\right)$ the arsenic atom is pentavalent, whereas in salvarsan, the arsenic is in the trivalent form. In addition, the latter compound contains the (OH) in the para position and the amido group (NH_2) in the ortho position, and both of these groups are chemically very active.

E. H.

SCHILLING (Cl.), VON KROGH (M.), SCHRAUTH (W.), and SCHOELLER (W.). **Die Wirkung organischer Quecksilberverbindungen bei Spirochäteninfektionen. (1. Mitteilung).** [The Action of Organic Mercury Compounds on Spirochaete Infections. Part I.]—*Zeitsch. f. Chemotherapie.* I Teil. Originale. 1912. Vol. 1. No. 1. pp. 21–43.

The authors have studied the action of a number of organic mercury compounds on spirochaetes, mainly with the object of determining the manner in which the respective compounds were effective. At first they employed fowls infected with *S. gallinarum*, but it was found that this infection was very uncertain in its reactions. Accordingly, in all subsequent experiments they employed mice infected with a very virulent strain of *S. recurrentis*.

An interesting series of preliminary experiments was performed on the properties of this strain. It was found that the virulence of the spirochaetes depended largely on the stage of the infection. Thus, mice that were injected with the blood of another animal the first day of infection lived distinctly longer than mice injected from the same animal on the second day, the average duration of life in the first case being 3·1 days and in the second 1·8 days. On the other hand those injected on the third day of the infection lived on an average 3·8 days, *i.e.*, slightly longer than those of the first day. The authors explain this diminution of virulence on the third day of the infection as the result of the antibodies present in the blood, which are injected together with the spirochaetes. The virulence of the strain was increased, until 24 hours after injection a mouse shewed 50-100 spirochaetes in each microscopic field. This strain was employed in all subsequent investigations of the effects of the mercurial compounds.

In addition, the authors seem to shew by the following experiment that spirochaetes produce toxins:—The blood of five heavily infected mice was mixed with 2 per cent. citrate-broth, the blood cells were removed by the centrifuge, and the remaining serum, *containing spirochaetes*, heated for one and a half hours at 45° C. This serum was then more strongly centrifuged in order to carry down the spirochaetes, and then divided into two parts. The blood of normal mice was also treated in a similar manner to the above, being mixed with 2 per cent. citrate-broth, centrifuged and then heated for one and a half hours at 45° C.

Mice were then injected with:—(1) The warmed serum from normal mice; (2) the serum from infected mice prepared as above described; and (3) the mass of dead spirochaetes carried down by the second centrifugation. All the mice died as a result of the injections, but the length of life averaged 4·5 days for the normal serum (1) and 5 days for the spirochaete serum (2). Thus under these conditions normal mouse serum becomes toxic for mice. On the other hand those injected with the dead spirochaetes (3) died on an average in 4·1 days, thus suggesting that these parasites contain toxic substances.

As a result of their researches on the effect of mercurial compounds on the virulent strain of *S. recurrentis*, the authors come to the opinion that these medicaments only act indirectly on the infection. The latter seems to affect chiefly the alimentary canal of infected mice, causing enteritis, and the mercurial compounds mainly act by combating these symptoms. Their action, therefore, is quite different to that of salvarsan, which directly kills the parasites without affecting the organs. The mercurial compounds are more organotropic than parasitotropic and act indirectly through the organs of the body. In addition, it is probable that these compounds have a stimulating effect upon the production of antibodies and in this way also indirectly affect the parasites.

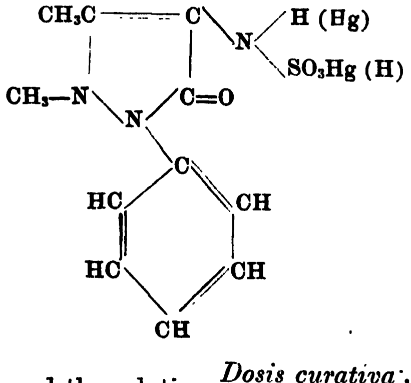
Of the numerous groups of mercury compounds which were tested only a few of the phenol derivatives were found to be relatively efficacious and in all these the Hg. was attached to the benzine ring by one valency only.

E. H.

KOLLE (W.), ROTHERMUNDT (M.) and PESCHIÉ (S.). **Untersuchungen über die Wirkung von Quecksilberpräparaten auf Spirochätenkrankheiten. I. Chemotherapeutische Wirkungen der Hg-Verbindungen und im besonderen eines neuen, stark auf Spirochäten wirkenden organischen Hg-Präparats von sehr geringer Giftigkeit.** [The Action of Hg Preparations on Spirochaete Infections, especially that of an Organic Compound of very low Toxicity.]—*Deut. Med. Wochenschr.* 1912. Aug. 22. Vol. 38. No. 34. pp. 1582–1585.

This paper contains an account of studies on the biological action of certain mercury compounds, especially those which are used in the treatment of syphilis, and of a new compound—Mercuric-sulphamino-dimethyl-phenyl-pyrazolone. The parasiticidal properties of the drugs were tested by their action on fowl spirochaetosis and their respective toxicities in both fowls and rabbits. As the result of an examination of the properties of a number of compounds very interesting relations were found to exist between the chemical constitution and the therapeutic properties. It was found that the simple mercuric salts of the aliphatic series are very inferior to organic mercury compounds containing either the benzine ring or the pyrazolone nucleus. In the two latter not only is there a considerable diminution in the toxicity, but also the relation between the *Dosis curativa* and *Dosis toxica* is much more favourable.

A suitable mercurial compound should possess strong parasitotropism with slight organotropism, so that it is quickly eliminated from the body. The authors find that the sulphamino group reduces the organotropism without affecting the parasitotropism; and that the latter property is increased if the Hg. is attached to a pyrazole nucleus and not directly to a benzine ring. E. SCHEITLIN has prepared a mercurial compound combining these qualities and this has been found to give the best results in the treatment of fowl spirochaetosis. The compound is known as mercuric-sulphamino-dimethyl-phenyl-pyrazolone and has the following constitution—



For this compound the relation $\frac{\textit{Dosis curativa}}{\textit{Dosis toxica}}$ is less than 1/100, which compares very favourably with that of Hermophenyl (1/60); from this point of view the next best organic mercury compound. The authors accordingly recommend that this new Hg. preparation should be used in conjunction with salvarsan in the treatment of syphilis.

E. H.

Levaditi (C.). **Intervention de l'Organisme dans la Guérison médicamenteuse des Maladies à Spirilles.**—*Bull. Soc. Path. Exot.* 1912. July. Vol. 5. No. 7. pp. 524–544. With 9 curves.

The present memoir is to some extent a summary of the previous work of the author, both alone and with various collaborators, on the mode of action of organic arsenical compounds on spirochaetes and trypanosomes. It also includes the accounts of experiments on the treatment of infections of *Spirochaeta duttoni* in rats by '606.'

Briefly stated, the author's conclusions are that in this disease the nearer one approaches the crisis before administering the medicament, the more quickly the parasites disappear and the less of the compound is necessary in order to effect this disappearance. In other words, the quickness of the sterilization of the blood of an infected animal is inversely proportional to the time which separates the moment of injection from what would have been the natural crisis of the infection. For example, a number of rats were infected with a strain of *S. duttoni* in which the first attack lasted four days. These rats were respectively injected with equal quantities of '606' at various times on the second and third days of the infection. Those injected on the beginning of the second day of the infection were not free from spirochaetes until 33 hours later, whereas in the case of the rats treated in the afternoon of the third day the spirochaetes disappeared in three and a half hours. In addition to this, it was found that a relatively rapid cure could be obtained by the use of smaller doses of the medicament if one was careful to administer the salvarsan during the course of this "precritical period" of the spirochaetal infection.

These results are only applicable to those parasitic diseases which terminate spontaneously with a crisis. They are not applicable, for example, to rats infected with *Trypanosoma brucei,* for in this case the disease is only terminated by the death of the animal and there is no spontaneous crisis.

Further proofs of the fact that "606" acts only in conjunction with the organism are the results obtained by the treatment of rats that had previously been vaccinated by the injection of spirochaetes killed by heating to 56° C. The rats which had been thus prepared were subsequently infected with spirochaetes and injected with "606" on the second day of infection. The parasites disappeared as quickly in these rats as if the drug had been injected on the third day, just before the crisis.

As for the mechanism of these phenomena two hypotheses are possible:—In the first case one can suppose that as the disease approaches the crisis the parasites become reduced in vitality and are more susceptible to the drug. The results of treating "prepared" rats on the second day of infection, which is far from the crisis, are strong arguments against this hypothesis. Again, if one takes the blood of an infected rat on the third day of infection, inoculates it into another rat, and immediately follows the inoculation by an injection of "606," the sterilization of the latter animal is only effected after twelve hours, so that the favourable influence of the "pre-critical period" has disappeared. The more probable hypothesis is as follows:—If the rats treated during the "pre-critical period" are cured more rapidly it is because during this period the organism has undergone a preparation which renders it able to destroy the spirochaetes both easily and promptly. By the administration of the drug at this opportune moment one causes a precocious crisis and the organism combats the infection with its usual forces, phagocytosis and possibly spirochaeticidal substances developed in the blood.

The importance of these results cannot be over-estimated, for they show that there is an opportune moment for the administration of "606" in the treatment of spirochaetal diseases. In the case of relapsing fevers the opportune moment is during the pre-critical period. It remains to be seen whether one can find a similar period in the case of syphilis.

[In the short space at the reviewer's disposal it is impossible to do justice to this excellent article, which is accompanied by curves and tables that clearly support the theories advanced.]

E. H.

CULTIVATION.

NOGUCHI (Hideyo). **The Pure Cultivation of** ***Spirochaeta duttoni, Spirochaeta kochi, Spirochaeta obermeieri,*** **and** ***Spirochaeta novyi.*** —*Jl. Exper. Med.* 1912. Aug. 1. Vol. 16. No. 2. pp. 199-210. With 2 plates.

Noguchi, by a similar method to that employed by him in the cultivation of *T. pallidum,* has succeeded in the culture of these four varieties of blood spirochaetes. The following method was found to be the most satisfactory:—Into a sterile test-tube place a piece of fresh tissue—usually rabbit-kidney. Add a few drops of citrated blood from the heart of the infected mouse or rat, and quickly pour about 15 cc. of sterile ascitic or hydrocele fluid into the tube. The contents of some of the tubes are covered with a layer of sterile paraffin oil, while others are left without oil. Incubate at 37° C.

It is advisable to employ the infected blood of a rat 48-72 hrs. after inoculation and before the spirochaetes have reached their maximum multiplication. With this method the author has succeeded in passing a culture of *S. kochi* through 29 tubes over a period of six months.

To make a subculture, 0·5 cc. of the original culture is added instead of the infected blood as above, but it is also advantageous to add a small quantity of normal rat or human blood.

(1) *Spirochaeta duttoni.*—In this spirochaete the maximum multiplication occurs on the 8-9th day. On the 10th the parasites begin to disintegrate and disappear, and by the 15th day it is exceptional to find any spirochaetes present. Subcultures can be made between the 4th and 9th days. These spirochaetes had not diminished in virulence at the 9th passage.

(2) *S. kochi.*—This variety attains its maximum development in the cultures on the 9th day. Its virulence seemed to diminish, for after the 10th passage it no longer killed rats and mice, and the incubation period was prolonged.

(3) *S. obermeieri* attains its maximum growth on the 7th day.

(4) *S. novyi* is more difficult to grow than any of the preceding varieties. It also attains its maximum growth on the 7th day.

In each case Noguchi examined the living spirochaetes from the cultures with the aid of dark ground illumination. Longitudinal division is stated to have been observed in every case, spirochaetes of all lengths dividing in this manner. Transverse division is said to be extremely rare, if present at all. When the spirochaetes first appear in the cultures numerous short forms are observed, but later all the parasites attain the normal length. Spirochaetes grown under a layer of oil are slightly thinner than those grown without this layer.

[NOGUCHI's results are of considerable interest, but his observations on the division of spirochaetes need confirmation; it is doubtful whether these parasites multiply by any other method than transverse division preceded by incurvation. It is to be regretted that the author should have employed the specific names *S. kochi* and *S. obermeieri* instead of *S. rossii* Nuttall (1905) and *S. recurrentis* Lebert (1874), respectively, as the latter have priority.]

E. H.

NOGUCHI (Hideyo). **Reinzüchtung der Spirochäten des europäischen, des amerikanischen und des afrikanischen Rückfallfiebers.**—*Münchener Med. Wochenschr.* 1912. Sept. 3. Vol. 59. No. 36. pp. 1937-1938.

Contains a preliminary account of the manner in which the author was able to cultivate various species of blood spirochaetes (see above). In addition, the culture of *S. gallinarum* is described. This was effected in exactly the same manner as that of the human blood spirochaetes; up to date there had been eight passages.

E. H.

OTHER PAPERS.

NICOLLE (C.) et BLAIZOT (L.). **Nouveaux Points de l'Etude Expérimentale du Spirochète de la Fièvre Récurrente Nord Africaine. Réceptivité du Lapin.**—*Bull. Soc. Path. Exot.* 1912. July. Vol. 5. No. 7. pp. 472–476.

By the intravenous injections of large quantities of infected blood the authors were able to maintain the spirochaete of a Tripolitan strain of relapsing fever through 12 rabbits in succession, without any diminution in virulence. UHLENHUTH and HAENDEL found this animal to be quite refractory to strains of African, American, and European relapsing fevers, respectively; yet by the injection of sufficient quantities of blood the least pathogenic of the "*recurrentis*" group of spirochaetes has been shown to be capable of infecting it.

The authors proceed to consider the means of distinguishing the different strains of spirochaetes. Of the three methods employed, the receptivity of laboratory animals has been shewn to be uncertain, cross immunisation is even more so, and at present the only criterion is the agglutination test.

E. H.

FRÄNKEL (Leonid). **Zur Biologie der Rekurrensfäden.**—*Virchows Arch. f. path. Anat. u. Physiol.* 1912. July 18. Vol. 209. No. 1. pp. 97–125. With 45 text figures.

After the examination of 150 cases of relapsing fever in Russia, the author believes that he has obtained proof that the spirochaetes attack both the leucocytes and the red blood corpuscles. The spirochaete is said to invade the leucocytes and cause degenerative phenomena in them, such as vacuolisation of the cytoplasm and breaking up of the chromatin of the nucleus. Phagocytosis, in the sense of the leucocytes taking in and digesting living and virulent spirochaetes, is therefore strongly denied. The paper is illustrated by 45 photo-micrographs of appearances in support of the author's hypotheses.

In addition Fränkel fed 3 *Stomoxys calcitrans* on a patient infected with relapsing fever and subsequently on a man and a woman, without producing any infection. Nevertheless the spirochaetes were found to preserve their form in the gut of the fly for some hours.

[The theories advanced in this long paper are not supported by the author's figures, which represent appearances indistinguishable from artefacts.]

E. H.

FONTANA (Arturo). **Metodo per Colorare Intensamente e Rapidamente il** ***Treponema Pallidum*** **ed altri Spirocheti.** [A Method for the Rapid and Intense Colouration of *Treponema pallidum* and other Spirochaetes.]—*Pathologica.* 1912. Oct. 1. Vol. 4. No. 94. pp. 582–583.

Dilute the material to be examined in a drop of distilled water, spread out over a slide, allow to dry in the air, and then fix in the flame. On to the slide pour a few drops of a five per cent. solution of tannic acid in distilled water, and heat gently for about twenty seconds; then wash in running water for thirty seconds. Now add a few drops of an ammoniacal solution of silver nitrate (prepared by adding ammonia to a five per cent. solution of $Ag NO_3$ in distilled water until the precipitate at first formed is just redissolved, giving a faintly opalescent solution) and warm the slide for twenty to thirty seconds according to the degree of coloration required. Then wash in water and dry between filter paper. The whole process occupies about seventy to eighty seconds. The spirochaetes are coloured either an intense yellow or brown and, as shown by the author's photographs, are very conspicuous. This method has given good results in the case of *T. pallidum, Spirochaeta refringens, S. balanitidis, S. dentium,* and *S. buccalis* respectively.

[The simplicity of this method of colouration together with its rapidity should make it most useful for diagnostic purposes.]

E. H.

SLEEPING SICKNESS.*

TRANSMISSION.

KINGHORN (Allan) and YORKE (Warrington). **On the Influence of Meteorological Conditions on the Development of *Trypanosoma rhodesiense* in *Glossina morsitans*.**—*Brit. Med. Jl.* 1912. Oct. 5. pp. 835–837; also in *Ann. Trop. Med. & Parasit.* 1912. Oct. 18. Vol. 6. No. 3. B. pp. 405–413. With Addendum.

Since the Luangwa Sleeping Sickness Commission has had its quarters on the Congo-Zambesi watershed evidence has accumulated which indicates that meteorological conditions have a very pronounced influence on the development of *T. rhodesiense* in *Glossina morsitans*. At Nawalia (circ. 2,100 ft.) in the valley eight transmission experiments were made; at Ngoa on the plateau (circ. 4,400 ft.) five. The results are shown in two tables. It is seen that at Nawalia the mean temperature in the eight experiments lay between 75° and 83°, the absolute maximum varying from 85° to 93° and the absolute minimum from 60° to 74°. On the plateau the mean temperature lay between 59° and 62°, the absolute maximum between 72° and 74°, the absolute minimum between 42° and 50°. Of 330 flies used in the valley six, and probably ten, became infective, the larger figure being based on the number of salivary gland infections. In the five plateau experiments 520 flies were employed, without one becoming infective. The most striking difference in the conditions under which these experiments were performed was in the temperature: roughly speaking this was 15° to 20° higher in the valley than on the plateau.

In a further series of experiments made on the plateau the flies were kept in an incubator at a temperature approximating to that in the valley; 61 were used in one experiment, 72 in another. Though the majority of the flies had died in seven days, one infective fly at least was obtained in each experiment. It is noted that infective wild flies were met with on the plateau during the period of the unsuccessful laboratory experiments; it is suggested that these flies were infected during the warmer season and had survived into the cold season. The results of feeding freshly-caught flies on healthy monkeys in the valley and on the plateau respectively are compared. In the valley 3,202 flies were fed in 29 batches and *T. rhodesiense* was isolated in six instances, giving a ratio of infective to non-infective of 1:534. On the plateau 5,041 flies were fed in groups on 39 monkeys, with four positive results, 1:1,260. As tsetse flies and game are about equally numerous at the two places and these are less than seventy miles apart, the authors think that the only essential difference is in the climatic conditions.

They note that at the most favourable season of the year for transmission experiments in the valley and also in the case of those carried out in the incubator the relative humidity was extremely low; they cannot say at present whether this is more than coincidence.

In the Addendum is published an experiment which shows that flies fed on an infected animal on the plateau and non-infective

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*** This section forms a continuation of the *Sleeping Sickness Bulletin*, the last number of which was published in September.**

after forty days became infective eight days or less after being placed in an incubator, whereas the control flies did not. It is suggested that the first part of the cycle can take place at a comparatively low temperature, but that a higher temperature is needed for its completion.

The authors' summary is as follows:—

> "The developmental cycle of *Trypanosoma rhodesiense* in *Glossina morsitans* is, to a marked degree, influenced by the temperature to which the flies are subjected. High temperatures (75-85° F.) favour the development of the parasite, whilst low temperatures (60-70° F.) are unfavourable."

A. G. B.

Robertson (Muriel). **Notes on the Polymorphism of *Trypanosoma gambiense* in the Blood and its Relation to the Exogenous Cycle in *Glossina palpalis*.**—*Proc. Roy. Soc.* 1912. Oct. 11. Series B. Vol. 85. No. B 582. pp. 527–539.

General condition of a T. gambiense *infection.*—It is noted that a close study of any given infection brings out very clearly that the multiplication of the trypanosomes occurs in the circulating blood. Search has been made for any type of multiplication in the cells of the lung, liver, and spleen, but so far without success. The author thinks that the invariable correlation between a rise in the number of trypanosomes and a rise in the percentage of dividing forms makes such a development very improbable. The factors controlling the number of flagellates present in the blood at a given time are discussed. The author's work has been done with monkeys.

The drop in the number of trypanosomes is often sudden, but the completeness of the clearance varies within wide limits, and the duration of the depressed period is quite inconstant. The mechanism by which the trypanosomes are destroyed has not been studied; the work of other observers points to phagocytosis, or lysis in the blood stream. All the evidence is against the possibility that the trypanosomes enter the host's cells; after their absence they reappear relatively gradually and their appearance is always accompanied by active multiplication in the blood stream. The coming and going of the trypanosomes is called the endogenous cycle.

Method.—Blood films were taken daily from a *gambiense* monkey at the same hour, dried in the air, and stained with Giemsa. They were measured by means of a compass set at one micron distance, as in Bruce's method. The criticisms of Dr. Stephens are considered (see *Sleeping Sickness Bulletin* Vol. 4, p. 145). It is remarked that the projection of the trypanosomes on to a screen is at present impossible in Central Africa; moreover, slight inaccuracy is not material because it is the relative and not the absolute lengths that are significant. Cages of newly-hatched flies were fed daily on selected monkeys and the number of flies infected were ascertained.

The endogenous cycle.—There is really no sharp distinction of the trypanosomes into separate types, but rather a continued transition from one type to another. After a discussion of the forms seen at different periods in the cycle this is interpreted as follows—

> "The short forms (15-20 μ) constitute the normal adult blood type; this expression is merely used to indicate the form which has the largest duration

in time in the cycle and which is the most stable. These increase in size and bulk, and form that sliding scale of individuals which may be termed the intermediate forms; these in turn lengthen out to the long, more slender types, which proceed to divide, giving rise once more to the short forms."

The sex interpretation appears to the author so improbable as hardly to merit discussion.

The Relation of the Endogenous Cycle to the Production of the Infected Fly.—The author tried to find out whether any definite condition either of the individual parasite or of the infection as a whole was requisite for the production of infected Glossina. The observation on negative periods in monkeys was confirmed (see *Sleeping Sickness Bulletin* Vol. 4, p. 267). It is noted that positive results are obtained in spite of a general tendency on the part of the flies to digest their parasites. A transmitting host whose digestion is rapid tends to have a relatively low percentage of carriers: thus, mosquitoes, fleas, and tsetse flies all produce relatively few carriers; whereas leeches and ticks, whose digestion is very slow, give ninety to a hundred per cent. Immediately after a drop in numbers there are very few trypanosomes and all are of the short type. This is an effective period and generally produces about the average number of *plus* flies. The trypanosome population has just suffered a process of elimination; these trypanosomes are therefore the resistant ones, as well as those capable of producing infection in flies. These results again are opposed to a sex interpretation of the dimorphism.

The general summary is as follows—

"1. *T. gambiense* is a polymorphic species with a continuous range of variation.

"2. The shorter forms of 14-20μ in length constitute the normal adult blood type.

"3. The intermediate individuals measuring 20-24μ in length are growth forms and lead to the long forms of 23-33μ, which are those about to divide. The polymorphism of the trypanosome is thus due to growth and division phenomena and does not correspond to a sex differentiation.

"4. The shorter forms are those destined to carry on the cycle in the transmitting host.

"5. There are definite periods when the blood is not infective to fly although trypanosomes are present. Such periods are (*a*) just before an outburst of multiplication; (*b*) during the destruction of trypanosomes preceding a depressed period; (*c*) the summit of an exalted period involving very numerous trypanosomes—at such a time the parasites very frequently show signs of exhaustion; (*d*) certain periods of rapid multiplication when both the absolute and relative numbers of the shorter forms are low."

A. G. B.

DUKE (H. L.). **Some Observations on *Trypanosoma pecorum* (Bruce) and *T. uniforme* (Bruce).**—*Proc. Roy. Soc.* 1912. Oct. 11. Series B. Vol. 85. No. B 582. pp. 554-561.

T. pecorum.—Though this trypanosome seems to be widely distributed in Uganda nothing definite is known concerning its true carrier in nature; *G. palpalis* would appear to be at most a facultative host. Again, nothing is known of its natural reservoir. Experiments were undertaken to discover whether *T. pecorum* is pathogenic to antelope or whether this animal is able to act as a reservoir. A young bushbuck born in the laboratory was inoculated from a monkey; trypanosomes appeared in its blood fifteen days later. At intervals clean flies were fed upon this bushbuck and afterwards upon clean monkeys. Flies dissected three months later were found to contain flagellates. There was one doubtful instance of transmission to a monkey; the fly (No. 9) which was probably responsible had its sucking stomach swarming with trypanosomes. A table is given showing the distribution of flagellates in fifteen infected flies dissected between the ninth and the 141st day. It is seen that only fly No. 9 had an infection of the sucking stomach. In every case the hind-gut was infected. No infection of the proboscis was observed before the 76th day; afterwards it was present in four cases out of five. The salivary glands were examined in three cases with negative result. Later, the blood of the bushbuck was injected into animals. A calf was thus infected 323 days after the original infection of the bushbuck. The bushbuck was throughout in good health.

T. uniforme.—According to Bruce and his collaborators this trypanosome causes a fatal disease in domestic ruminants. In Duke's experience *T. uniforme* is not a fatal trypanosome; in only one instance has an animal died of the infection. Two situtunga brought alive to the laboratory were found to harbour this trypanosome as a natural infection. Laboratory-bred *G. palpalis* were fed on them from time to time. It was shown that the animals were still capable of infecting these flies after a period of ten months; trypanosomes were found in the proboscis only.

The author notes that in Uganda alone *T. gambiense, T. vivax, T. pecorum* and *T. uniforme* have all been proved capable of surviving for a considerable time in antelope, apparently without exerting any injurious effect upon them.

A. G. B.

SLEEPING SICKNESS INVESTIGATIONS IN UGANDA.

Reports of the Sleeping Sickness Commission of the Royal Society, No. 12. 1912. London: H.M. Stationery Office. 145 pp. and 30 plates. Price 5*s.* 6*d.*

This volume contains sixteen articles, of which nine have been published in full and two in part in the *Proceedings of the Royal Society.* These have been summarised in the *Sleeping Sickness Bulletin.* There remain five papers, all on work done in Uganda.

i. *The Development of Trypanosomes in* Glossina palpalis (Fraser and Duke, pp. 36-56)—

All the flies used in these experiments were hatched in the laboratory from pupae collected on the shore of the Victoria Lake. A table is given of the laboratory temperatures during the eight months they lasted.

T. gambiense.—Seven experiments were done to transmit *Trypanosoma gambiense* by *Glossina palpalis.* The infected animals were in each case monkeys. The data, in some experiments imperfect, are given in a table. The number of days the flies were fed on an infected animal was two in four instances and one in three. In one case only was transmission effected. Several of the experiments are given in detail. A table gives the result of the fly dissections. Of 384 flies dissected at various periods between the first and the eightieth day 32 were positive, all examined between the first and the thirtieth day, but it is noted that in the one successful experiment the flies remaining on the

62nd day were the only ones dissected. In all the positive flies the gut, especially the midgut, was the chief site of infection with flagellates; in the majority the proventriculus was negative. Flagellates were seen a few times in the salivary glands, never in the proboscis. Three plates illustrate the morphology of the forms seen, another that of a remarkable flagellate, which is evidently *T. gallinarum* (see *Sleeping Sickness Bulletin* Vol. 4, p. 351).

Similar experiments were done with *T. brucei*, *T. pecorum* and *T. uniforme*; their morphology in the flies is shown in a series of plates. The conclusions are as follows.—

" *Trypanosoma gambiense, brucei, pecorum,* and *uniforme* undergo a development in laboratory-bred *Glossina palpalis*.

" 2. In the case of *Trypanosoma gambiense* and *brucei* the gut is the chief site of development.

" 3. In *Trypanosoma pecorum* the proboscis in addition to the gut is usually infected after the 50th day from the infected feed.

" 4. Development of *Trypanosoma uniforme* in the fly is limited to the proboscis."

ii. *The Duration of the Infectivity of the* Glossina palpalis *after the removal of the Lake-shore population* (FRASER and DUKE, pp. 63-75)—

This was a continuation of the work of the Sleeping Sickness Commission of the Royal Society 1908-9. The experiments are given in detail, their object being to ascertain if wild *G. palpalis* were capable of giving rise to Sleeping Sickness in healthy monkeys. The following table shows the results—

Table I.

Date.	Experiment.	Place.	No. of flies put on.	Result.	Remarks.
1910.					
Aug. 8–15	21	Kibanga	44	+	Flies caught on mainland.
„ 16–Oct. 19 ...	48	„	3,220	—	
Sept. 1–Dec. 31 ...	122	„	6,625	—	
„ 25–Oct. 1 ...	198	Nsanga	2,390	—	
„ 28–Oct. 1 ...	199	„	1,940	—	
Oct. 2–6	208	„	2,090	—	
„ „	209	„	1,780	+	
„ 7–13	223	„	2,160	+	
„ „	224	„	2,580	—	
„ 22–Nov. 7 ...	289	Bukafu	1,750	—	
„ „ ...	290	„	1,750	—	
Nov. 16–21	321	Kibanga	850	+	
1911.					
Jan. 3–Feb. 22 ...	478	„	6,279	—	
Feb. 13–20	597	„	3,075	+	
„ 23–Mar. 16 ...	683	„	6,095	—	
„ 27–Mar. 31 ...	641	„	8,450	—	
Jan. 22–29	557	Kimi Island	4,324	—	Flies caught on islands.
„ „	558	„	4,120	—	
Feb. 2–10	591	Nsadzi Island	3,265	—	
„ 4–10	592	„	2,500	—	

" When these results are compared with those reported by the Sleeping Sickness Commission of the Royal Society, 1908-09, the point which is most

striking is the large number of negative experiments now recorded and the great increase in the number of flies necessary to infect a healthy monkey with *Trypanosoma gambiense* by feeding wild *Glossina palpalis* upon it. When the 1908-9 Commission's experiments were carried out—from November, 1908, until September, 1909—about 500 flies caught on the mainland were usually sufficient to infect a monkey. We now find from observations made during the period August, 1910, to March, 1911, that some 10,000 are required, and that during the latter half of that time 28,294 flies were put upon susceptible monkeys, and caused only one infection. These facts seem to indicate that the infectivity of Lake-shore *Glossina palpalis* is gradually becoming less.

"There are, however, still a few infected flies to be found. Where they derive their infectivity it is impossible to say definitely."

It is noted that a few natives, some of them islanders, still remain on the Lake shore and it does not seem unlikely that they may be the source of infection. In any case, *G. palpalis* on the Lake shore have been shown capable of infecting monkeys with *T. gambiense* three years after the removal of the population.

iii. *Various Experiments* (FRASER and DUKE, pp. 75-78)—

These include experiments on hereditary transmission, on the longevity of laboratory bred *Glossina palpalis*, and the possibility of *G. palpalis* acquiring *T. grayi* by contaminated feeding. In the experiments to test the longevity of the flies 260 were fed daily till their natural death. One female survived till the 185th day; the others died at earlier periods, two being still alive after 160 days.

iv. *Experiments devised and carried out by Dr.* van SOMEREN (pp. 78 and 79)—

Five *T. gambiense*-infected monkeys were treated by arsenophenylglycin. According to the table the dose was 0·5 gm.; according to the text 5 gm. One animal survived 178 days; the others died between the third and 41st day. Two experiments to see if *Stomoxys* can act as a carrier of trypanosomes were negative. Apparently, few flies were alive when the flies were transferred to the healthy monkey.

v. *Progress Report on Investigations into the Bionomics of* Glossina palpalis, *July* 27, 1910, *to August* 5, 1911 (G. D. H. CARPENTER, *vide infra*).

A. G. B.

BIONOMICS OF TSETSE FLIES.

CARPENTER (G. D. H.). **Progress Report on Investigations into the Bionomics of *Glossina palpalis*, July 27, 1910, to August 5, 1911.**—*Reports of the Sleeping Sickness Commission of the Royal Society.* 1912. No. 12. pp. 79–111. With 4 plates.

These investigations were chiefly concerned with the following points—(1) Length of life of the fly, (2) Duration of infectivity of the Lake shore fly, (3) Natural enemies, (4) Breeding grounds, (5) Food supply. An account is given of the places selected for work; one was on the mainland and two were islands.

The method adopted to ascertain the length of life of the fly was to mark large numbers by amputation of the leg through the centre of either the tibia or fibula and to ascertain how long afterwards marked specimens could be caught at the same spot.

Between July 27 and October 15, 1910, 8,143 were so marked and liberated, females slightly predominating. Marked flies subsequently caught were noted and liberated. The results are shown in a table. The search for marked flies was continued up to February 11, 1911. After the end of January *G. palpalis* had become much reduced in numbers, so that few could be caught. One female fly was retaken 182 days after it was marked; it was probably then a freshly hatched fly. A male fly retaken had a minimum life duration of 149 days. [Compare the results of FRASER and DUKE above.] The relation between the meteorological conditions and the number of flies caught is shown in a chart. It is noted that a decrease in the relative humidity of the atmosphere is responsible for a large drop in the number of flies; they are killed off in large numbers at the onset of the dry weather.

Duration of Infectivity.—On Damba Island a monkey showed trypanosomes after it had been fed on by 885 flies. The last inhabitant had been removed from the island a year and ten months previously.

Natural enemies (a) *of the pupa.*—No evidence was obtained that these are destroyed by vertebrates. No parasites were bred from 5,600 pupae kept in wooden boxes. Of the pupae found in nature, some had a small round hole indicating the exit of a parasite, and others a larger irregular opening made from outside by an enemy which devoured the contents. Carpenter was unable to discover what insect made this hole.

(b) *of the perfect fly.*—He examined the stomach contents of 26 bee-eaters and 26 other birds of insectivorous species, all with negative results. The observations of ROUBAUD* on the fossorial wasp *Bembex* as an enemy of tsetse flies were confirmed and extended. The burrows are constructed in light soil or sand. Carpenter remained near a burrow and watched a *Bembex* catch *palpalis* off his clothes. It caught thus 29 *palpalis* and two other flies in three and a quarter hours. Afterwards he opened up the burrow and found a full-grown larva with 31 tsetse flies; ten were females and of these eight contained large larvae. The *Bembex* has its own enemy, a small Muscid fly of the genus *Idia*, which enters the burrow and lays its eggs there, so that its larvae consume the flies intended for the *Bembex* larvae. Carpenter kept a *Bembex* larva in captivity. In 21 hours it eat nine specimens of *Glossina palpalis*. Unfortunately the *Bembex* does not confine its attentions to tsetse flies, and the ground everywhere is not suitable for its burrows. No evidence was obtained of any disease amongst *Glossina palpalis*.

Breeding grounds.—These are described, with photographs. The place where most pupae were obtained (2,000 to 3,000 monthly) is formed of small pebbles mixed with coarse sand, left owing to subsidence of the Lake some four to five feet above its present level, and about four to five yards from the present water's edge. The belt of vegetation comes to an abrupt end and pupae are found at the edge of this belt, which faces south-east and is in shade after midday. The flies were never seen to deposit their larvae in the sun; Carpenter witnessed the birth of eight. The conclusions are these—

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* *Compt. Rend. Acad. Sci.* 1910. Vol. 151. No. 8. pp. 505-508.

"1. Favourite sites for depositing pupae are those which are in shade, but where there is free air circulation.
"2. The soil, commonly gravel or coarse sand, must be dry and loose.
"3. The fly does not extrude its larva until the middle of the day, always selecting a shady spot."

Food supply.—An attempt was made to find out why the proportion of the sexes collected differ on the mainland and on the islands. Flies were examined on the mainland and on islands to find out what proportion contain mammalian and non-mammalian blood respectively. No evidence was obtained of a female preference for mammalian blood. The chief source of non-mammalian blood on Damba Island is, Carpenter believes, cormorants and darters or the Varanus lizard. On two occasions he observed numbers of *Glossina palpalis* attacking Varanus, he himself not being touched. He has never seen a tsetse drink water nor insert its proboscis into vegetable tissues. On Damba Island the gut of 455 flies was examined for vegetable organisms. Numerous organisms were found, which are depicted in three plates.

Bacilli and Trypanosomes.—In the examination of 600 flies the frequency of occurrence of bacilli and trypanosomes was noted. The fore part of the gut was sometimes of a bright carmine colour; this was found to be due to a mass of amorphous granules of a translucent carmine colour lying in the lumen, called here carmine granules. The results are given in a table.

Table V.

—	T. Trypanosomes.	B. Bacilli.	G. Granules.
1. Percentage of total flies containing either T., B., or G.	11	19·3	5·5
2. Percentage of each heading, of males ...	43·9	50·8	33·3
3. Percentage of each heading, of females...	56·1	49·2	66·7
4. Percentage of cases under each heading in which T. also occurred.	—	3·4	51·5
5. Percentage of cases in which B. also occurred.	6·1	—	9·1
6. Percentage of cases in which G. also occurred.	30·3	2·6	—

The table shows that it is extremely uncommon to find both bacilli and trypanosomes in the same fly. There would appear to be some connection between the carmine granules and the trypanosomes. The granules are non-crystalline and insoluble in alcohol and water. The conclusion is that there is marked incompatibility between trypanosomes and bacilli in the gut of the fly.

Contents of the gut of freshly-bred flies.—The flies examined had just emerged from the pupae and had the proboscis bent under the thorax. 205 were examined and bacilli were present in 9·8 per cent. In addition there were seen large crystals. Various organisms also were found in the gut of these bred flies and one in a larva; they are figured. One was believed to be a larval nematode.

The sex proportion.—Of 1,400 flies bred from pupae obtained on Damba Island 48 per cent. were male and 52 per cent. female, whereas in nearly 5,000 caught during the same period 78 per cent. were male and 21 per cent. female. The cause of this is obscure.

Tsetsefuges.—Four preparations were tried and found to be useless.

The vitality of pupae.—Pupae were submerged in water and exposed to the sun. The submersion experiments showed that should any breeding ground be flooded at intervals by heavy rains all the pupae would not be destroyed; even four successive submersions for 24 hours did not destroy more than half. Other experiments showed that complete submersion between 108 and 120 hours is necessary to destroy the pupae totally, and that a certain proportion can survive flotation for eight days. Other experiments showed that, though neither twelve hours' submersion nor fourteen hours' exposure to sun have, alone, any effect, if employed alternately they are fatal. Pupae covered with one inch of earth and repeatedly exposed to the sun all died.

A. G. B.

VORWERK. **Bericht über Versuche mit Fliegenleim.** [Experiments with Tsetse Lime.]—*Arch. f. Schiffs. u. Trop. Hyg.* 1912. October. Vol. 16. No. 19. pp. 651–658.

These experiments were devised to see if *Glossina palpalis* could be exterminated in circumscribed areas by CLEVE's tsetse lime method. They were carried out at the mouth of the river Mnege (? Tanganyika), where this species is numerous and where four isolated groves of trees stand. Fly communication between these was prevented by the destruction of the long grass and reeds. The experiment took place in March during the rainy season. To begin with, practised fly-catchers caught flies in each of the four places between eight o'clock and midday. Every day for a fortnight a goat provided with limed cloths was taken to each place, tended by a boy provided also with limed cloths. At the end of the fortnight control catches were made by the fly-catchers, and fourteen days later more controls. The results are shown in a table. It is noted that the numbers of flies caught did not steadily diminish, but after a preliminary diminution remained stationary; that a single fly-catcher in four hours caught about the same number of flies as a man-trap and goat-trap together during the whole day; and that at the end of the experiment the number of flies had diminished in each group. However, at the second fly catching, fourteen days later, the numbers had increased again. It is concluded that it is not possible to exterminate *palpalis*, even under favourable conditions and in a small space, by this method. The boy and the goat were free from trypanosomes at the outset; at the end of the experiment each was found to be infected. It is doubted whether the boy's infection was contracted during the experiment, but it is advised that natives who take part in such demonstrations should be kept under the influence of atoxyl. It is noted that more male flies were caught than female, and more than three times as many on the boy as on the goat. Some details of cost are given. The lime was of no use for catching mosquitoes.

By means of the lime spread on a board four rats were caught by the tails; the rest disappeared from the building. It is suggested that the lime, which has small value in exterminating tsetse flies, may have a future as a rat-trap.

[These results correspond with those of KOCH, whose experiments concerned *G. morsitans* in German East Africa (*Sleeping Sickness Bulletin* Vol. 4, p. 263). He demonstrated 'the great superiority of a single fly-catcher over not only a single fly-trap but the whole lot put together.' The lime method may have its uses, but they are more limited than CLEVE's experiments seemed to show.]

A. G. B.

MORPHOLOGY.

SCHEPILEWSKY (E.). **Fadenförmige Anhängsel bei den Trypanosomen.** [Thread-like Appendage in Trypanosomes.]—*Centralbl. f. Bakt.* Abt. I., Orig. 1912. July 3. Vol. 65. Nos. 1–3. pp. 79–83. 1 plate.

The author first gives an account of the well-known morphology of *Trypanosoma brucei* and *T. equinum*, and a short review of the work of WASIELEWSKI and SENN, who observed elongation of trypanosomes in slides of rat blood. WENDELSTADT and FELLMER also noted elongation and free flagella, as did other workers cited by the author in some detail. The chief interest of the paper lies in Schepilewsky's own observations on *T. brucei* and *T. equiperdum* using Reichert's "*Spiegelkondensor.*" With this form of ultra-microscope the flagellum of a trypanosome is seen to be surrounded by a thin pellicle along its whole length, so that, strictly speaking, there is no true free flagellum. In the living *T. brucei* and *T. equiperdum* one can often see thin, thread-like appendages arise either from the apex (*Spitze*) of the flagellum or from the hinder, blunt end of the body or sometimes even from both. The threads resemble spiderwebs, are of even contour, are very refractile, and vary in length, some being 1½ to 2 times the length of the body. When a thread arises at the posterior end the appearance of a *Trypanoplasma* is produced. The origin of the threads is undoubtedly from the flagellum. When the trypanosomes move the threads often drop off. At the death of the trypanosome the threads dwindle rapidly, break up into granules and are dissolved.

The author appears to suggest that the loss of the threads disturbs the stability of the trypanosome, and makes one conjecture whether the threads may be of protoplasmic origin.

H. B. Fanthan.

BLACKLOCK (B). On the Presence of Posterior Nucleated Parasites in a Strain of *T. brucei.*—*Brit. Med. Jl.* 1912. Oct. 19. p. 1057.

The strain in question came from Uganda and was obtained from BRUCE in September, 1910. It having been observed during other experiments that some of the short stumpy forms had the nucleus posterior to the centre, films taken from the laboratory animals at the Runcorn Laboratories were carefully examined. It was found that in films from rats, rabbits, and guinea-pigs such forms appear, usually in small numbers. These are figured. In no case was the nucleus seen to lie posterior to the blepharoplast, but in some it approached it closely.

[Since the posterior nucleated forms in *T. rhodesiense* were described, similar forms have been found by WENYON in '*T. pecaudi*' (? *brucei*) from the Sudan, by YORKE and BLACKLOCK in *T. equiperdum* (laboratory strain) and now by BLACKLOCK in *T. brucei* (Uganda).]

A. G. B.

CULTIVATION.

THOMSON (John Gordon) and SINTON (John Alexander). The Morphology of *Trypanosoma gambiense* and *Trypanosoma rhodesiense* in Cultures: and a Comparison with the Developmental Forms described in *Glossina palpalis.*—*Ann. Trop. Med. & Parasit.* 1912. Oct. 18. Vol. 6. No. 3. B. pp. 331–356. With 3 plates.

Many culture media were tried by the authors; the most successful were the following:—

(1) A modified Novy-MacNeal-Nicolle medium, made by substituting citrated rat's blood for defibrinated rabbit's blood. The medium consists of agar 14 grammes, pure sodium chloride 6 grammes, and distilled water 900 c.c. The agar must be carefully washed and the medium sterilised at 100° C. for 20 minutes on three successive days. To this a sterile mixture of rat's blood (from the heart) and sodium citrate (1 per cent.) is added. The mixture consists of about two parts rat's blood to one part citrate.

Equal quantities of the agar medium and citrated blood were used. The tubes were kept in a water bath at a temperature of 45° C. for half an hour, to destroy the complement without making any appreciable change in the character of the blood. They were incubated for two days at 25° C. to allow the water of condensation to collect. Such a medium was found most suitable for the culture of *Trypanosoma gambiense* and *Trypanosoma rhodesiense*. Citrated human blood, treated similarly, was also useful.

(2) A fluid medium also was tried successfully. It consisted of human pleuritic fluid (rendered complement free by heating to 45° C. for one hour), to which was added one-third its volume of citrated human blood.

All the media, however, are somewhat uncertain.

The blood used to inoculate tubes was obtained, aseptically, from the heart of an infected rat just killed. The cultures were incubated at 22° C. to 24° C.

The authors' summary and conclusions are as follows:—

(1) *T. gambiense* and *T. rhodesiense* are capable of being cultivated on artificial media. *T. gambiense* has been cultivated for a period of thirty-seven days, and during that time was carried through four generations by means of sub-cultures. *T. rhodesiense* has been more difficult to cultivate and has continued to develop for only twenty-one days. All the flagellates disappeared in the third sub-cultures.

(2) The life history of these trypanosomes in culture tubes is similar to that which occurs in the gut of the insect host. This is shown by a comparison of the morphological characters of *T. gambiense* in cultures with those forms found by Sir David Bruce and his colleagues in *Glossina palpalis*. We find that the developmental forms found in the culture tubes are identical in their chief characteristics with those described by Bruce in the gut of an infected tsetse-fly.

(3) The cultures of *T. gambiense* and *T. rhodesiense* quickly lose their infectivity, and intraperitoneal injections of these into rats after the third day have been unsuccessful in causing an infection. This we have shown to be comparable to the results of Sir David Bruce and his colleagues, who have found that the intestinal contents of *G. palpalis* quickly become non-infective. The infectivity during the first few days appears to be due to the persistence of some of the original blood forms. In successful cultures, therefore, we expect infectivity to cease as soon as these blood forms disappear and the 'healthy developing forms' which have been shown by Bruce to be non-infective appear.

(4) Our cultures of *T. gambiense* and *T. rhodesiense* have remained non-infective after the third day, and we believe that this is explained by the fact that the infective [short, stumpy] forms such as found by Bruce and his colleagues in the salivary glands of *Glossina palpalis* did not occur in our cultures, and we have suggested that probably some transference of the cultures to a new medium or environment similar to that of the salivary glands of the tsetse-fly might be required to permit the full life history of the trypanosomes being completed.

(5) Cultures of *T. rhodesiense* seem to differ from those of *T. gambiense*. In cultures of the former typical posterior nuclear forms such as described by Stephens and Fantham (1910) are relatively common, whereas in the latter they are of very rare occurrence.

(6) Although the so-called 'male' and 'female' forms are present in cultures we were unable to find any definite evidence of a sexual cycle.

The paper is well illustrated. There is a coloured plate showing the cultural forms of *T. gambiense* and a similar one of *T. rhodesiense*. There is a third plate of microphotographs of a division rosette and a colony of *T. rhodesiense*.

H. B. F.

SLEEPING SICKNESS NEWS.

Nyasaland and Rhodesia.

In Part 17 of the *Sleeping Sickness Diary*, by Dr. H. HEARSEY, P.M.O., dated June 30th, 1912, it is stated that thirteen cases of sleeping sickness had been notified in Nyasaland during the last quarter. These added to the 63 previously reported make a total of 76. Twelve of these cases were discovered by Dr. SHIRCORE, now in charge of the sleeping sickness area. An account of each case is given. Three medical officers who had been investigating in the adjoining districts had not, at the time of writing, been successful in finding cases; it is considered probable, however, that these exist. An account is given of a case of trypanosomiasis in a European contracted in Portuguese East Africa, recorded by Dr. STANNUS (see *Sleeping Sickness Bulletin*

Vol. 4, p. 266). A second case of trypanosomias is from Portuguese East Africa, in a native, has been recorded. An account is given of the administrative measures taken to restrict the disease.

Dr. A. May, P.M.O., Northern Rhodesia, says that up to the end of June 1912 seventy cases of trypanosomiasis had been found in that country. It is thought that a greater number has escaped observation. Almost all the cases have come from the Luangwa closed area; with the exception of four natives still under treatment all have ended fatally.

A. G. B.

*French Congo.**

The investigations of Aubert in the Upper Sangha region (noted in *Sleeping Sickness Bulletin* Vol 4, p. 84) are referred to. The author's visit was paid five months later. At Carnot Aubert found a severe epidemic of sleeping sickness, twenty per cent. of the population being infected. He gave to each patient an injection of atoxyl. The author first examined as many as possible of 253 patients treated by Aubert. 24 had died and no information could be obtained about 81. He examined the blood and glands of 148, and found parasites in the gland juice of seventeen and in the blood of four. In the case of 69 others the blood was centrifuged and trypanosomes were thus found in nine. The author calculates that if all had submitted to this process sixteen relapses would have been thus detected. The total result was that five to six months after a single injection of atoxyl 25 per cent. of the cases had relapsed, a result which is characterised as satisfactory. [It is not stated here nor in Aubert's paper what dose of the drug was given.] The details are given in tables.

The author looked for fresh cases at Carnot. The diagnosis was made by examination of gland juice and direct examination of the blood. The result showed that 26 per cent. of the natives were infected and a still higher percentage in the surrounding villages. Tables again are given.

He notes that his observations generally agree with those of Aubert, both as to the incidence of the disease and the presence of *Glossina palpalis*. At Carnot this fly was very rare; during his stay he saw only one specimen. The plateau on which the town is built has been completely cleared and many of the villages have been moved. Nevertheless, the epidemic continues to spread. The immediate result of the injections of atoxyl given by Aubert was that the mortality almost completely disappeared; but the improvement lasted only a short time. Montfort draws the obvious conclusion that the treatment must be continued longer. He says that in the neighbourhood of Carnot

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* **Montfort. Contribution à l'Étude de la Répartition et de la Prophylaxie de la Trypanosomiase humaine dans la Haute Sangha (Avril–Mai 1911).—*Ann. d'Hyg. et Méd. Colon.* 1912. July–Aug.–Sept. vol. 15. No. 3. pp. 593–612.**

horse flies and Stomoxys are numerous and suggests that these may be responsible for the spread. The paper contains a map.

A. G. B.

Belgian Congo.

SCHWETZ (J.). **Les Glossines dans la Vallée de la Lukuga (Tanganyika).**—*Revue Zoologique Africaine.* 1912. September. Vol. 2. No. 1. pp. 49–62. With 1 map.

The Lukuga river, as is shown on a chart, leaves Lake Tanganyika and flows westwards to join the Lualaba river. The observations detailed in this paper were made in the upper third of the Lukuga valley over a distance of 85 kilometres. *G. palpalis* is found without interruption between the Lake and the Lualaba river, and this is of special importance because the valley will eventually be occupied by a railway. The valley is extremely rich in big game and here *G. morsitans* abounds. The spheres of these two species are said to be distinct, *morsitans* not being met with till the observer is many metres from the river bank. *Morsitans* was found not only near, but also in villages. In one spot *Glossina fusca* was numerous. The author says that, generally speaking, it is beyond doubt that sleeping sickness is found only in *palpalis*, not in *morsitans* regions. An account is given of the other rivers on the west side of Tanganyika. At one place a specimen of *G. brevipalpis* was taken, and identified by AUSTEN. On the map which accompanied the paper the distribution of *G. morsitans*, *G. palpalis* and *G. fusca* is shown.

A. G. B.

MISCELLANEOUS.

HALBERSTAEDTER (L.). **Versuche mit einem spontan arsenfesten Trypanosomenstamm.** [Experiments with a Strain of Trypanosomes Spontaneously Arsenic-fast.]—*Arch. f. Schiffs. u. Trop. Hyg.* 1912. October. Vol. 16. No. 19. pp. 641–647.

The author notes that the various species of trypanosomes behave very differently towards individual chemical substances. For instance, trypanred is very effective in mal de caderas, but useless, or nearly so, in nagana; nagana trypanosomes are, therefore, naturally resistant to trypanred. Similarly, there are differences in sensibility to arsenic amongst nearly related spirochaetes and amongst malarial parasites. Moreover, different strains of the same species of trypanosome, propagated in laboratories in small animals, behave in this respect in very different ways; the different behaviour of such strains to arsenicals caused EHRLICH to introduce the terms 'tenax' and 'debilis.' Hitherto, however, a strain spontaneously fast towards the most active arsenicals, such as arsacetin and salvarsan, has not been described.

The strain of which this paper treats was one of mal de caderas obtained by Professor LUTZ from an infected horse in Brazil. Since April, 1908, it had gone through 720 passages in mice or rats. Neither the horse nor any of these animals had been treated with arsenicals. At the beginning of 1912 it was discovered by chance that the strain was fast to atoxyl; it was therefore tested with other chemotherapeutic agents. It was found to be absolutely fast towards arsacetin and salvarsan; the largest doses which could be given did not influence the course of the infection. Unfortunately, the author had no other strain of caderas with which to compare it, so that one of nagana had to be used for this purpose. The behaviour of the strain was then tested with arsenophenylglycin and it was found that a single injection of 1:600 solution brought about permanent cure. The effect of arsenophenylglycin was tested at the same time on three strains of nagana, one of which was fast to arsacetin. All reacted to arsenophenylglycin. The fact that arsenophenylglycin acts on arsenic-fast strains is explained by EHRLICH by the assumed existence of an aceticoceptor in the trypanosomes, with which the acetic acid radicle of the arsenophylglycin first unites. The strain behaved normally to para-rosanilin-chloral-hydrate (parafuchsin). The action of potassium antimonyl tartrate was then tested; this was of interest on account of the close relation between antimony and arsenic preparations; the strain was found to be easily influenced by this drug, just as was the normal nagana strain.

Lastly, experiments were made on the direct action of salvarsan on trypanosomes in the test tube.

A. G. B.

BORCHERS (Carl). **Einige Beobachtungen über den Wundverlauf bei Schlafkranken. Intravenöse Äthernarkose bei einem Schlafkranken.** [Observations on the Course of Wounds in Sleeping Sickness.]—*Arch. f. Schiffs. u. Trop. Hyg.* 1912. October. Vol. 16. No. 19. pp. 648-651.

The author in the Belgian Congo had occasion to operate on four natives infected with trypanosomiasis. The operations were, a radical cure of hernia, suture of a large contused wound, the removal of adenoids, and the opening of an abscess over the mastoid process. Three of the patients had been previously treated with atoxyl, eight or more half-gram injections, but in one of these trypanosomes were present in the glands. The fourth was a native boy who had a passport allowing him to travel on the railway; trypanosomes were found in his cervical glands. The wound edges in the first two cases had a peculiar bacon-like appearance and abundant thin pus was secreted; the removal of the adenoids was followed by middle-ear suppuration, and in the last case the tissues became gangrenous. All improved rapidly when atoxyl was given. It is noted that in these cases the tissues had been unable to protect themselves against infection, and there was no tendency to heal until specific treatment was instituted.

To the patient operated on for hernia ether was given intravenously by BURKHART's method. Gland puncture done five hours later showed numerous unaltered trypanosomes.

A. G. B.

Delanöe (M. et Mme. Pierre). **Sur les Rapports des Kystes de Carini du Poumon des Rats avec le *Trypanosoma lewisi*.**—*Compt. Rend. Acad. Sci.* 1912. Oct. 7. Vol. 155. No. 15. pp. 658-660.

The authors note that, following on the work of Chagas on the development of *Schizotrypanum cruzi*, Carini discovered cysts in the lungs of rats infected with *Trypanosoma lewisi*, which cysts he considered were schizogonic stages of the flagellate. These cysts measured, on an average, 5 μ in diameter, and were usually oval. They enclose eight vermicules, which appear to be binucleate.

At first agreeing with Carini's interpretations, the authors however record that (1) rats immune to *T. lewisi* continue to show numerous cysts in their lungs; (2) inoculation of young rats with an emulsion, rich in cysts, derived from immune rats, was not followed by the appearance of trypanosomes in the blood-stream. Adult rats were more frequently parasitised than young rats. Of 22 adult rats the cysts of Carini were found in all, but none was infected with *T. lewisi*.

The lung-cysts are transmissible by direct contagion. The authors conclude that the pneumocysts of Carini represent a new parasite of rats. If the parasite is worthy of generic rank they propose for it the name *Pneumocystis carinii*. The affinities are, perhaps, to be sought among the Coccidia.

H. B. F.

BOOK REVIEW.

Daniels (C. W.) and **Newham** (H. B.). **Laboratory Studies in Tropical Medicine.** 3rd Edition. Demy 8vo. 535 pages. 164 text figures, 7 charts, and 6 coloured plates. 1911: London: John Bale, Sons & Danielsson, Ltd. (Price 16*s*. net.)

In the preface to the third edition of this well known text book the authors state that since the appearance of the last edition many advances have been made in the study of tropical diseases; new facts dealing with disease and its propagation have been made out and new details of technique have been elaborated. The book follows the tradition of the previous editions in being essentially practical. Brief descriptions of the more important protozoa, helminths, etc., are given, but in no sense is the book to be taken as a complete account of parasites in general. As the authors state, the classification of parasites and insects is constantly changing as new facts come to light; no authoritative schemes of classification are therefore given. Those inserted have been found by practice to be useful, and although differing in many details from those adopted by authorities at the moment, will, the authors believe, be of utility to the average man. New details have been added, which it is trusted will enhance the value of the book as an aid to the practical worker. The type is clear and there are many illustrations. More of these could have been incorporated with advantage. The contents follow the order of the practical course given at the London School of Tropical Medicine. A practical work such as the above must be in the hands of all workers in tropical medicine and those of the present time may congratulate themselves upon having the details of such an intricate subject presented to them in so compact and readable a form. The work is a popular one and deservedly so.

G. C. Low.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. I.] 1912. [No. 2.

PLAGUE.

Plague in India.

Liston (W. Glen). **Report of the Bombay Bacteriological Laboratory for the Year 1911.**—43 pp. 1912. Bombay: Govt. Central Press.

In this laboratory is prepared all the anti-plague vaccine which is used in India and its dependencies. In the year 1911, 1,211,170 doses were distributed, as compared with 625,690 of the previous year. The laboratory receives statistics of the incidence of plague in the inoculated and uninoculated. These are not published in their entirety, but a selection in the form of thirty tables is given, the figures of which are left to the reader to combine. The reviewer has epitomised them in the following summary.

Inoculated.					Not inoculated.				
Population.	Attacks.	Deaths.	Incidence per 1,000.	Case mortality per cent.	Population.	Attacks.	Deaths.	Incidence per 1,000.	Case mortality per cent.
118,148	941	371	7·96	39·5	321,621	11,041	8,695	34·4	78·6

It is seen that under similar conditions, while the incidence of plague in the inoculated is approximately 8 per thousand, it is 34 per thousand in the uninoculated. Moreover, while the case mortality of plague in the inoculated is about 40 per cent., that of the uninoculated is over 78 per cent.

The Director draws attention to errors of frequent occurrence in plague statistics. The uninoculated population is often overestimated, on account of the exodus from a focus of plague owing to fear of infection. The number of inoculated may be overestimated when monetary rewards are granted. The number of attacks and deaths among the uninoculated is often recorded from the date when plague first appeared, and these figures are compared with the number of attacks and deaths after the introduction of inoculation. If inoculation is not begun until the close of the epidemic, the numbers are not comparable. This may be seen more readily with the aid of an example, compiled from pages 12 to 15 of the Report.

Attacks and Deaths from Plague among the INOCULATED and the UNINOCULATED of Salem Town from 11th August, 1910, the beginning of the epidemic, to 31st March, 1911, the end.

Month.	Inoculated.			Uninoculated.		
	Population.	Attacks.	Deaths.	Population.	Attacks.	Deaths.
August	—	—	—	73,000	77	64
September ...	1,375	—	—	61,700	299	250
October	10,720	14	11	37,300	270	255
November ...	20,304	163	86	9,700	585	508
December ...	27,874	156	65	6,130	379	338
January	39,103	93	59	4,900	78	75
February ...	48,514	7	4	7,500	4	4
March	52,440	1	1	8,060	1	1
Totals ...	—	434	226	—	1,693	1,495

To obtain an estimate of the value of inoculation, at first sight all that may appear to be necessary is a census of the population at the end of the epidemic, classifying the people into two groups, inoculated and uninoculated, and an enumeration of the cases of plague which attacked the two groups respectively. The ratio of attacks per 1,000 might then be calculated. Thus at the end of the epidemic in Salem there was a population of 52,440 inoculated and 8,060 uninoculated. 434 cases of plague attacked the former, which equals an incidence of 8 per 1,000 inoculated, and 1,693 occurred in the latter, which gives a ratio of 210 per 1,000 uninoculated. Reference to the table shows that this rate, 210 per 1,000, is erroneous; for during the acme of the epidemic in November there were 585 attacks among the 9,700 uninoculated, which equals an incidence of 60 per 1,000 only. Hence we must not use the census figures at the end of the epidemic in estimating the uninoculated. Let us suppose that the population of Salem remained uninoculated until February and March and that 52,440 inoculations were performed in these months. Eight cases of plague only befel the inoculated in February and March. Hence the incidence of plague in the inoculated, under our supposition, was 0·15 per 1,000. But it is seen in the table that inoculation was introduced at the beginning of the epidemic and that there were 434 attacks of plague among the 52,440 inoculated, which is equal to 8 per 1,000. Therefore if inoculation is delayed until the end of the epidemic, the incidence of plague in the inoculated will be small, and the benefit derived from inoculation may be overestimated. Fallacies of this kind have been excluded from the statistics included in the Report.

The conditions which obtain in a prison are as precise as those of a laboratory experiment. 1,240 prisoners and the establishment were inoculated in Dharwar Jail. Though cases were occurring in the closest proximity none of the inoculated were attacked. 4,386 inmates of His Majesty's Common Prison, Bombay, were inoculated. One developed plague. It was probable that he had been already infected when he was inoculated.

Investigations were undertaken to determine the influence of the age of the culture of *B. pestis* used for the preparation of the vaccine, and the effects of storing it. Cultures of two months' growth are more powerful than those incubated for longer periods. The former give rise to much more severe reactions than the latter. The protective power of the vaccine varies with the severity of the reaction which it excites. Storage mitigates the vaccine. The best results were obtained with a vaccine, prepared from a two months' growth, which had been stored for some months not exceeding eighteen. Experiments with preparations four years old and upward showed that they were destitute of immunizing properties. Inoculation does not produce a negative phase in rats. The immunity reaction commences almost immediately. Anti-plague vaccine can be safely administered to the residents of plague-infected houses. Inoculation begins to lessen the fatality of plague a week after its use. There is a considerable amount of clinical evidence in the Report to the effect that those attacked with plague eight or more days after inoculation suffered mildly. One observer noted that the immunity afforded by the vaccine continued for twenty months.

During three years 444 cases of plague were studied for the purpose of ascertaining the therapeutic value of anti-plague serum. Half these cases were treated by subcutaneous and intravenous injections of the antitoxin, and half without. The fatality of the serum-treated cases was 66·1 per cent. That of the controls was 73·4 per cent. The serum modified the course of the disease; life was prolonged and the number of bacilli in the blood was lessened. No patient recovered under any form of treatment if his blood contained more than forty bacilli per cc.

The well-known difficulty of inducing wild rats to breed in captivity was overcome. A single pair of rats may multiply to forty pairs in a year, though it is probable that this rate of increase is not attained in the field. In the course of a series of epidemics of plague there is evolved a race of rats which is immune to the infection. This discovery is so important, since it allows us to predict the ultimate disappearance of plague, that it is quoted *in extenso.*

> "Using for experimental inoculation a minute dose of plague virus, say 12 to 24 thousand virulent plague bacilli which is equivalent to about one hundred thousandth of a grain of an infected rat's spleen, we at present find that 97 to 100 of every 100 rats from Madras City die after infection, and that only some 20 out of every 100 rats from Bombay City will succumb. Not only so, but repeating the experiment with large numbers of rats, we find that plague-free towns, such as Madras, Raipur, Banda, and Dacca, yield rats which give a 90 to 100 per cent. mortality from plague, and that plague-stricken places like Cawnpore, Lucknow, Poona, and Bhagalpur, yield rats highly immune to the disease, and giving a mortality of only 20 to 40 per cent. Moreover the immunity of the rats in each of these places is in proportion to the number and severity of the epidemics from which each town has suffered. Cawnpore shows the greatest immunity with a mortality between 12 and 20 per cent., depending on the dose of plague given. Poona and Bombay rats come next with a mortality between 16 and 25 per cent.; Lucknow and Bhagalpur follow with 30 and 40 per cent. respectively. That this immunity to plague is transmitted from parents to offspring, and is not acquired, is indicated by the fact that young rats from Bombay, and young rats from Poona caught at an age

and at a time when they could not have been exposed to infection, are only very slightly more susceptible to plague than adult rats of the same places."

All the immunity experiments were made on rats (*Mus rattus*) caught in Madras and sent to Bombay.

C. Birt.

PLAGUE IN THE FAR EAST.

JANSSEN. **La Peste à Java.**—*Le Caducée.* 1912. Aug. 24. pp. 220–222.

There is a considerable commerce between the port of Soerabaya in the island of Java and India and China. In January 1911 there was great mortality among the rats in the flour and rice stores of that place. Dead rats were found in the cargoes of rice discharged there. This was the source of the epidemic, which in the five following months attacked 1,500 people in a population of 740,000; 80 per cent. of those stricken died. The districts Malang, Soerabaya, Kedri, and Madiden, which comprise the eastern part of the island, were invaded. The houses are constructed of bamboo. Rats live in the interior of the bamboo poles, and between the matting walls and partitions of the dwelling. The *Xenopsylla* is the common rat-flea. Another species, the *Pygiopsylla*, occurs, which will attack man after fasting for six days. Neither *Pulex irritans*, nor *P. serraticeps* were discovered on the Java rats. 35 fleas were counted on a rat which had been found dead on a bed, but they were not numerous as a rule.

Climatic conditions appeared to be without influence on the epidemic and the epizootic. Malang is surrounded with mountains, and communication with other districts could be stopped effectually. Isolation camps were pitched; sometimes whole villages were removed. Fleas in clothing were destroyed by formalin and ammonia vapour in a moist atmosphere. Rigorous isolation of pneumonic cases was enforced. The houses were rendered rat-proof by encasing the bamboo piles with zinc, and obliterating the cavities in the stem with concrete. The matting forming the walls was so hung that it might be easily removed. Rat destruction was energetically carried on; they were killed at the rate of 50,000 a day for some months. 40,073 prophylactic inoculations were given. Among those vaccinated, 155 cases and 123 deaths occurred from plague.

C. B.

BRADDOCK (C. S.) [Jr.]. **Bubonic Plague, Seen at Close Range in the Far East. Some Random Notes.**—*New York Med. Jl.* 1912. Aug. 31. Vol. 96. No. 9. pp. 419–420.

On the eve of the author's arrival at Yokohama in the year 1902, plague broke out. Within 24 hours thousands of people were segregated, and a fence of corrugated iron embedded six inches into the ground was placed around a block of buildings, which were then burnt to the ground. At Korat (Siam) all of two hundred cases were bubonic; 193 died. Ten days later there was an outbreak of pneumonic plague at Ban Phagi, two hundred miles away—22 cases all of which were fatal; none was of the bubonic type. The epidemic was not so severe in Siam as in China, since in the former the people live in the open air, whereas in China they reside in closed rooms. The Chinese isolate plague patients separately in temporary shelters. In the event of death the body is cremated by setting fire to the shed. At Petchaburi (Siam) the infected rat-fleas sought refuge on dogs. Many children died from plague contracted by fondling these animals. Braddock states that it is recorded that during the great plague of London households with dogs suffered most. He found that wearing shoes and stockings, and leggings saturated with ' coal oil ' was an effective preventive measure.

C. B.

LEPEUPLE (Dr.). **Un Cas de Peste Septicémique à Bord du "D'Iberville."**—*Arch. Méd. et Pharm. Nav.* 1912. Aug. Vol. 98. No. 8. pp. 138–143.

A case of septicaemic plague occurred on board the ship D'Iberville in August 1911, while she was cruising along the coast of Annam and Tonkin. It is probable that coolies employed in carrying out some repairs conveyed the infection. No dead rats were discovered. The whole crew, which consisted of 150 persons, received hypodermic injections of 10 cc. of anti-plague serum. All contacts were treated in a like manner. The ship was vacated and fumigated. No other case appeared.

C. B.

KLODNITZKY (N. N.). **Zur Frage der Entstehung und Verbreitung der Lungenpest.** [On the Origin and Spread of Pneumonic Plague.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1912. Aug. 24. Vol. 66. No. 1. pp. 49–59.

In the year 1894 the Russian physicians RESCHETNIKOW, BELAWSKY and RUDENKO observed cases which resembled pneumonic plague in the Transbaikal province of Siberia. Before this time, however, it was currently reported that a disease occurred which swept away whole families and was associated with great mortality in the rodents known as tarabagans. Small annual epidemics of plague broke out in the autumn, less frequently in the winter, among the Transbaikal population and that of the neighbouring parts of Mongolia. The semi-nomadic habits and paucity of the people limited these outbreaks, but on the construction of the railway the spread of plague was facilitated. In the year 1905 plague appeared at the colliery of Djalainor, 15-18 kilometres from the station Mandschuria on the railway line. The disease was confined to Cossacks; no Chinese were attacked. Annual outbreaks occurred in the period 1906-1909 at this station.

In 1910 the epidemic began in the Transbaikal province in September and advanced with great rapidity from Mandschuria along the line to Kharbin. In Kharbin and the neighbouring Chinese town, Fudjadjan, the native population were seized at the rate of 150-200 a day. It was currently reported that the plague was connected with the greater activity displayed in hunting the tarabagan, caused by the considerable rise in the price of their skins. ZABOLOTNY and ISAEW discovered an infected tarabagan from which they isolated the plague bacillus. These outbreaks bear a certain analogy to those which have occurred almost every year since 1899 among the nomadic population of the Kirghis Steppes, where a marmot is a plague carrier. In both these areas the plague epidemics begin in the autumn or winter and are of the pneumonic type.

In the year 1910 Klodnitzky at the plague congress in Astrakhan advanced the view that the plague bacillus was conveyed in the food in some instances. He thought that the social and religious customs of the inhabitants of the Steppes had much to do with the spread of the disease. The neighbours and relations of the deceased take part in the ablution of the body which immediately precedes the funeral feast; hence infection may be conveyed through unwashed hands. Moreover, the custom of distributing the clothes of the dead prevails. At Saraitschikow in the Ural province 415 persons lost their lives from plague after the funeral of a wealthy Cossack, which about a hundred attended.

Klodnitzky states that the plague bacillus multiplies rapidly in bugs, in which it remains alive and virulent for three months. Though his attempts to transmit the infection from bugs to mice failed, he thinks that this insect may be a carrier.

C. B.

Epidémiologie et Prophylaxie de la Peste. (Exposé de Quelques Données Récentes.)—*Bull. Off. Internat. d'Hyg. Pub.* 1912. Sept. Vol. 4. No. 9. pp. 1592-1614.

More than 40,000 lives were lost in the epidemic of pneumonic plague which ravaged Manchuria from October 1910, to March 1911. In the middle of October 1910, 10,000 tarabagan hunters were congregated in Manchuli and Khailar on their homeward journey. There was an epizootic of plague among these marmots. It has been proved experimentally that the marmot during its winter sleep acts as a reservoir of the *B. pestis* (vide p. 68). It is at times carnivorous; hence it is possible that it may be infected by feeding on the corpses of those who have died of plague, since it has been ascertained that the *B. pestis* retains its vitality and virulence for a year in bodies interred in those parts where the marmot abounds (vide p. 70). The first case of plague occurred amongst these hunters at Manchuli on the 12th October 1910. The man had probably infected himself while skinning a diseased tarabagan.

At this time of the year the cold is very severe, the thermometer often registering 40° Centigrade below zero; hence the people throng together in small unventilated rooms for the sake of warmth. If agar plates are exposed in front of a pneumonic plague patient while he is talking or coughing, colonies of *B. pestis* appear on incubating at 37° C. Therefore it is seen that the infection was spread from man to man, rats playing no part in its dissemination. Domestic animals contracted lung plague, and in a few instances they appeared to transmit it to human beings. Veils made of three-fold thicknesses of gauze afforded protection to the attendants on pneumonic plague patients. It is necessary that the veil worn by the patient should remain dry; if it becomes moist, it no longer arrests the passage of the droplets of sputum. Anti-plague inoculation, which is so effective in warding off bubonic plague, has not the same protective value in the pneumonic form. HAFFKINE vaccinated 132 people in the Kharbin Hospital with a mixture of his prophylactic and anti-plague serum; 22 died of plague; ten of these were tuberculous. FANG-CHIN reported that four deaths from lung plague occurred in 439 inoculated persons, KASAI eight in 2,832, BOGUSKI seven in 8,865. UYAMA inoculated 1,923 and WORRELL 80 people, who all escaped. Prophylactic injections of anti-plague serum averted plague in four out of five persons who had occupied the same room as a sufferer from pneumonic plague. It had no curative action on the disease however.

C. B.

SERUMS AND VACCINES.

TODD. **Plague Treated with Anti-Pest Serum.**—*Bull. Soc. Path. Exot.* 1912. July. Vol. 5. No. 7. pp. 459–462.

Thirteen cases of bubonic plague were treated with the Pasteur Institute anti-plague serum in the Bethesda Hospital, Canton. Six patients, who received intravenous and subcutaneous injections of about 100 cc. within the first twenty-four hours of their illness, recovered.

C. B.

FROST (Wade H.). **Active and Passive Immunization against Plague.**—*U.S. Public Health Rep.* 1912. Aug. 23. Vol. 27. No. 34. pp. 1361–1371.

The author thus describes the vaccines which have been employed for the production of active immunity against plague.—

1. HAFFKINE's prophylactic, which he states is a six-weeks' old broth culture of the *B. pestis*, incubated at 25° to 30° and sterilized by heating at 65° C. for one hour, after which 0·5 per cent. of phenol is added.

2. The German Plague Commission vaccine, which consisted of sterilized emulsions of agar cultures.

3. LUSTIG and GALEOTTI's powder, which is prepared by digesting one-day old agar cultures of the plague bacillus in 0·75 per cent. of sodium hydrate at 10° C. for 24 hours, filtering through paper, adding acetic acid to the filtrate, collecting and drying the precipitate.

4. FERMI and BANDI's vaccine which consists of the peritoneal exudate of guinea-pigs which have been inoculated with virulent plague bacilli. This is preserved for two days in the ice chest, incubated for 12 hours at 37° C. and then sterilized by heating to 52° C. on two successive days. The exudate is diluted with physiological saline fluid containing 0·5 per cent. phenol and 0·25 per cent. sodium carbonate.

5. Shiga and Besredka employed emulsions of dead *B. pestis* grown on agar, mixed with anti-plague serum.

6. Strong made use of suspensions of living plague cultures which had been attenuated by long subculture, or by growth on an unfavourable medium, obtained by the addition of alcohol or other chemical substances.

Kolle and Otto found that immunizing effects were produced in 45 per cent. of rats by living attenuated plague bacilli, in 22 per cent. by Haffkine's and the German Plague Commission's vaccines, and in 16 per cent. by Lustig and Galeotti's powder.

Shiga and Besredka ascertained that the addition of the anti-plague serum rendered the local reaction less severe. Immunity was conferred rapidly on animals.

Strong inoculated 42 criminals with living plague bacilli; some received whole agar cultures. No harm resulted, beyond local and general reactions. Immune bodies were afterwards detected in the blood of 24.

The serum of animals which have been immunised by the foregoing methods is used for conferring passive immunity and for serum therapy. It is difficult to standardize. Mice are the animals which show the protective value of the serum best. The passive immunity which is induced in monkeys, rats and guinea-pigs does not last longer than fourteen days, and is not constant during that period. Frost states that the prophylactic action of the serum is uncertain, as there are several instances in which plague has developed 12 to 20 days after its injection. He however advocates its administration to those who have been exposed to infection. Workers in plague laboratories should be inoculated with the Haffkine prophylactic every six months. The author says that he has not consulted the original papers to which he refers, except in a few instances. His references, moreover, are some years old.

C. B.

Annual Report of the Sanitary Commissioner with the Government of India for 1910.— 1912. Calcutta: Superintendent, Government Printing, India. p. 67.

Anti-plague Inoculation.—Sure proof of the efficacy of inoculation against plague was afforded by the continued immunity of the staff of the Bombay Plague Laboratory, comprising 116 persons. In connection with their work they were brought constantly into contact with plague-infected rats and fleas; yet they escaped infection, since they had been inoculated every year.

C. B.

BIONOMICS OF FLEAS AND RODENTS.

Nicoll (William). **On the Length of Life of the Rat-Flea apart from its Host.**—*Brit. Med. Jl.* 1912. Oct. 12. pp. 926–928 and Oct. 26. pp. 1097–1098.

Fleas (*Ceratophyllus fasciatus*) were taken from rats or rat cages and were placed in small flasks, on the bottom of which was a thin layer of sterile sand. The flasks, plugged with cotton wool, were kept at temperatures of 15°-23° C. in the summer, and 10°-17° C. in the winter.

He made 89 experiments, using 7 fleas in each.

The average length of life of *C. fasciatus* apart from its host is under seven days. Of 505 fleas 46 lived fourteen days or more, and 10 survived 21 days or longer. They live longer in winter than in summer. They may remain alive two months without feeding, if the temperature does not exceed 10° C. This period may be extended to ten weeks if they are kept in the ice-chest. Temperatures above 25° C. are injurious to them. They die within 24 hours when they are incubated at 37° C. Excess of dryness or of moisture is harmful to them. Exposure to bright daylight was rather more favourable to them than darkness or shade. Fleas which were removed from the cage were somewhat hardier than those captured from the rat.

The larval and pupal stages are greatly prolonged under certain conditions. The sweepings of a cage in which large numbers of fleas and their larvae were present were placed in a tall glass vessel. The material retained some of its moisture below, but became as dry as dust in its upper layers. Living fleas were observed in this vessel for more than twelve months. In two other experiments in which the sweepings were damp, the fleas disappeared in two months. The presence of larvae towards the close of the experiments suggested that the fleas bred in captivity under these unfavourable conditions. Under ordinary circumstances the rat-flea completes its developmental cycle in a fortnight or three weeks. In warm damp weather this may be shortened to ten days.

C. B.

SCHOLZ (Dr. Fritz). **Probleme der Pest und der Pestbekämpfung.** [On Plague and its Prophylaxis.]—*Centralbl. f. Bakt.* 1 Abt. Orig. 1912. June 24. Vol. 64. Festschrift. f. Prof. Dr. Loeffler. pp. 44–52.

This paper reviews our present knowledge of plague. It is designed to bring about an alteration in the German laws for the prevention of plague, which need revision. Bubonic plague is spread through the agency of fleas; pneumonic plague infection is conveyed in the droplets of saliva and mucus. The author finds that fleas dislike the smell of coumarin, which kills them in 2 or 3 hours. Naphthalin and iodoform also are used for this purpose. In the Manchurian epidemic of pneumonic plague face masks afforded protection against infection; prophylactic inoculations failed. The author states that the incubation period of pneumonic plague is still doubtful. SIMOND thinks that it rarely exceeds 3 days. The Manchurian observers, however, consider that 7 to 9 days would be more correct. He draws attention to the important observations on the hibernation of the rat-flea, *Ceratophyllus fasciatus*, by GAUTHIER and RAYBAUD. It may remain alive without nourishment for 45 days, at the end of which plague bacilli may be recovered from it. This fact may explain the origin of outbreaks otherwise unaccountable.

C. B.

McCoy (George W.). Notes on the Bionomics of Rats and Ground Squirrels.—*U.S. Public Health Rep.* 1912. July 5. Vol. 27. No. 27. pp. 1068–1072.

The author states that there is no definite breeding season for rats (*Mus norvegicus*) in San Francisco. This accords with the Indian observations. Rats may survive five days' starvation. One, totally deprived of water, lived for 35 days on dry wheat. Fourteen were in good health at the end of 30 days, during which they had subsisted on bread, meat, cheese and carrots, without any water. Three lived for 60 days on bread, meat and cheese only. The breeding season of the squirrels is from February to April. They feed on grass and grain.

C. B.

PLAGUE IN MARMOT AND SPERMOPHILE.

Dujardin-Beaumetz (Ed.) and Mosny (E.). Evolution de la Peste chez la Marmotte pendant l'Hibernation.—*Compt. Rend. Acad. Sci.* 1912. July 22. Vol. 155. No. 4. pp. 329–332.

The marmot, *Arctomys marmota,* or the tarabagan, inhabits the mountains of eastern Siberia in great numbers. *TCHERKASSOFF remarked that tarabagan hunters were liable to a fatal illness; this is now recognised as plague. Transbaikalia and Mongolia appear to have been foci of plague from time immemorial. The authors searched for an explanation. The tarabagan in its normal state succumbs rapidly to the plague infection; but it was not known how it reacted to the bacillus during its winter sleep, when its temperature remains not more than two degrees higher than that of the air. They inoculated three hibernating tarabagans with *B. pestis.* One died two days later; the second survived 61 days, and the third 115 days. The bacillus was present in enormous numbers in all the bodies post mortem, although the temperature of the animal had not exceeded 8° Cent. No local reaction or glandular enlargement was caused. The tarabagan, therefore, forms a reservoir for the plague virus during its hibernation.

C. B.

Schurupoff (J. S.). Ueber die Empfänglichkeit der Ziesel (*Spermophilus guttatus*) für die Bubonenpest. [The Susceptibility of the Spermophile to Bubonic Plague.]—*Centralbl. f. Bakt.* 1 Abt. Orig. 1912. July 17. Vol. 65. Nos. 4–5. pp. 243–256.

The spermophile or ground-squirrel is a rodent of the family of *Sciuridae*, inhabiting eastern Europe, the Caucasus, northern Asia, and north America. It is about the size of a European squirrel. It causes great damage to crops wherever it is abundant. During the winter it hibernates. It thrives well in captivity, and is easily tamed. Experimental plague is readily induced in this rodent; it succumbs in 2 to 7 days. Three hours detention in a cage with infected animals is sufficient to excite the disease.

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* *Erinnerungen eines Jägers aus Ostsiberien* 1856, 1863. Leipzig 1864.

Schurupoff states that his experiments show that the infection is conveyed in food, or by inhaling infected dust, or through slight injuries. He does not appear to have investigated the ectoparasites of this animal.

C. B.

EXTERMINATION OF RODENTS.

RUCKER (Wm. Colby). (i.) **The Necessity for Rodent Extermination in American Seaports.**—*Jl. Amer. Med. Assoc.* 1912. July 27. Vol. 59. No. 4. pp. 243-244. (ii.) **The Eradication and Prevention of Bubonic Plague.**—*U.S. Public Health Rep.* 1912. July 19. Vol. 27. No. 29. pp. 1130-1142.

In America the ground squirrel (*Citellus beechyi*) does not live near houses, and rarely travels far. Though susceptible to plague, it does not transmit it directly to man; but it acts as a reservoir for the virus which infects the rat. In warehouses rats have been destroyed by suspending a bait between two overhead electric wires from which the insulation has been removed for a short distance. The rat shunts the current through its body, while crawling over these unprotected parts of the wires, and falls into a vessel of water below. Sulphur dioxide, carbon dioxide, carbon monoxide, or the funnel gases are valuable for the fumigation of ships. Concrete is the best rat-proofing material. Concrete foundations, basements, and floorings should be installed in houses, stables, warehouses and other places where food stuffs are stored. Galvanized iron is not so satisfactory. Guards must be placed to prevent rats ascending and gaining access to the building through doors, windows, ventilators, and the roof.

C. B.

RUCKER (W. C.). **How to Poison Rats.**—*U.S. Public Health Rep.* 1912. Aug. 9. Vol. 27. No. 32. pp. 1267-1268.

Rats do not object to the odour and taste of phosphorus. It is best incorporated with a glucose base, since it is then less liable to spontaneous combustion. This paste, containing 4 per cent. phosphorus, is spread on all sides of pieces of stale bread, one inch square by three-quarters of an inch thick. The bait is placed in the rat-holes, or if these are inaccessible in boxes closed on all sides, except for an aperture two inches in diameter which will admit rats but not domestic animals.

C. B.

LONG (John D.). **A Squirrel Destructor. An Efficient and Economical Method of Destroying Ground Squirrels.**—*U.S. Public Health Rep.* 1912. Sept. 27. Vol. 27. No. 39. pp. 1594-1596. With 7 figures.

The destruction of the American ground squirrel by laying down poisoned grain is effective in the dry months, July to October, only. Placing balls of cotton waste saturated with carbon disulphide in their burrows is unavailing in the hot weather, when the ground is parched and cracked.

Long has devised a vaporising pump with a hose and a receptacle of nine pints' capacity. The hose is inserted into the squirrel's burrow to the extent of a foot. The earth is pressed round it. Half an ounce of refined carbon disulphide is put into the vaporising chamber. Thirty strokes of the pump are given, which cause twelve cubic feet of a 1·5 per cent. carbon disulphide vapour to be driven into the hole. The hose is withdrawn and the burrow is sealed with earth. The animals make no effort to escape, become unconscious, and die in half to three-quarters of an hour. Forty burrows can be treated in this manner in an hour. The cost is less than in the case of other methods of destruction.

C. B.

UNCLASSED.

SCHURUPOFF (J. S.). **Ueber die Vitalitätsdauer des Pestbacillus in Leichen an der Pest Vestorbener.** [The Vitality of the Plague Bacillus in the Corpses of Plague Patients].—*Centralbl. f. Bakt.* 1. Abt. Orig. 1912. July 17. Vol. 65. Nos. 4–5. pp. 225–243.

Plague has been epidemic in the Kirghiz Steppes for more than ten years, and has now extended to Astrakhan and the Ural district. It assumed the pneumonic form in the outbreaks of the years 1905, 1909, and 1910. VOKOTE investigated the vitality of the plague bacillus in the bodies of putrid mice. KLEIN ascertained that it was alive and virulent in the decomposing tissues of guinea-pigs which had been kept at various temperatures for 18 to 22 days after death. MAASSEN recovered the bacillus from dead rats which had been incubated at 18° C. for 20 days. SLATOGOROFF ascertained that the *B. pestis* survived only 5 days in the dead guinea-pig at 35° C., but that it lived for 109 days if the cadaver was frozen.

Schurupoff himself had observed that laboratory cultures seven years old were still living; hence it appeared probable that this micro-organism would continue to live in the human plague corpse. He exhumed 17 bodies of the victims of plague. They were in a state of good preservation, since the soil in which they were interred contains 20 per cent. of salt: moreover they became frozen in the winter. From six of them he recovered virulent plague bacilli, although they had been buried for a year in some instances. To induce the disease it was necessary to rub into a large shaven area of a guinea-pig's abdomen a considerable amount of the material from the cadaver.

C. B.

MANNING (J. v. V.). **Bedbugs and Bubonic Plague.**—*Med. Record.* 1912. July 27. Vol. 82. No. 4. pp. 148–150.

The author draws attention to VERBITSKI's experiments on the transmission of plague by *Cimex lectularius.* These insects infected guinea-pigs by their bites for five days after feeding on a plague animal. MARLATT* states that the bedbug can survive starvation for several months. It can live on moistened wood. The female deposits 6 to 50 white oval eggs grouped together in cracks and crevices. These hatch in a week or ten days. Maturity is attained in seven weeks. The bug is gregarious and nocturnal in its habits, effectually concealing itself during the day. A bait prepared by emulsifying mercury with egg-albumen is a destructive poison for them. Hydrocyanic acid or sulphur dioxide fumigation is useful.

C. B.

MATSUO (K.). **Gleichzeitiges plötzliches Auftreten von Pestfällen bei Menschen und bei Eseln in demselben Gehöft.** [Simultaneous Occurrence of Plague in Men and Donkeys in the same Homestead.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1912. Aug. 10. Vol. 65. No. 6–7. pp. 417–423. With 1 plate.

In the epidemic of pneumonic plague which prevailed in North Manchuria from October 1910 to April 1911, and caused the loss of 40,000 lives, donkeys also contracted the infection. Matsuo isolated virulent plague cultures from the lungs of one of these animals. It seems certain that in some instances the infection was conveyed to them directly from man. They appear to be able to transmit the disease again to man.

C. B.

HOSSACK (W. C.). **Some Comments on the Outbreak of Rat-plague in Suffolk and the Manchurian Epidemic of Human Plague.**—*Indian Med. Gaz.* 1912. July. Vol. 47. No. 7. pp. 259–262.

The author directs attention to cases in which the rat flea is not the carrier of the plague infection. The disease is sometimes an acute septicaemia which causes secondary pneumonia; hence the *B. pestis* may be conveyed directly from man to man. He refers to VERBITSKI's successful experiments with human fleas, and quotes WALKER, who reported an outbreak of nine cases of plague in Meiktila (Burma) in 1910. Bugs were plentiful, but no fleas were to be found. WALKER induced plague in a rat by causing it to be bitten by a bug which had fed on a plague patient.

C. B.

MERESHKOWSKY (S. S.). **Ein neuer Nährboden, auf dem der Bacillus Danysz selbst nach langandauernden, fortlaufenden Ueberimpfungen seine Virulenz nicht verliert.** [A New Medium on which the Bacillus of Danysz does not Lose its Virulence.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1912. July 17. Vol. 65. No. 4/5. pp. 393–399.

Danysz' bacillus, which is used for the destruction of rats, loses its virulence when it is grown on the usual media. MERESHKOWSKY finds that this property is retained if the bacillus is transplanted into a white of egg decoction. Hard-boiled white of egg, is finely minced and added to water in the proportion of 10 per cent. The fluid is autoclaved for five minutes, filtered, and again sterilised in test tubes. The tubes are incubated at 38° C. for 24 hours after inoculation, and are kept in a dark and cool place for two or three days when fresh inoculations must be made. 24-hour broth cultures from these are used to infect the bait for the rats. The 679th passage of Danysz' bacillus in this egg medium caused the death of rats, after eating food containing it, in 7 to 9 days.

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* MARLATT (C. L.). The Bedbug (*Cimex lectularius* Linn.)., *U.S. Dept. of Agricult., Division of Entomology—Circular* No. 47, 2nd Series. (Revised Edition.)

C. B.

KING (Howard D.). **Plague: The Menace of the United States of America.**—*Jl. Amer. Med. Assoc.* 1912. July 27. Vol. 59. No. 4. pp. 237–242.

The author states that plague is prevalent at the present time along the western coast of South America, and in Costa Rica and Cuba. Since the salient feature in this pandemic is that it advances along the highway of commerce, he sounds a note of warning. The experience of San Francisco shows that it is possible to reduce effectually the number of rats in dwellings, warehouses, wharfs, and ships. He says that it is one of the most interesting sights on arrival at the Port of London to observe the red-uniformed band of rat-killers come on board and begin operations before the passengers have disembarked.

C. B.

PÖCH (Rudolf). **Zur gegenwärtigen Ausbreitung der chinesisch-indischen Pestepidemie.** [The Present Distribution of Plague.]—*Wien. Med. Wochensch.* 1912. Aug. 10. Vol. 62 No. 33. pp. 2190–2199.

This a popular account of the present pandemic. It is well written, and is easy reading. The author mentions many names, but gives no references; hence the article is not of great value to the specialist.

C. B.

McCOY (George W.). **The Technique of the Laboratory Examination of Rats for Plague.**—*U.S. Public Health Rep.* 1912. July 26. Vol. 27. No. 30. pp. 1174–1187.

The rats are immersed in an antiseptic solution to destroy ectoparasites. The skin is reflected from the whole of the front of the body in order to expose the cervical, axillary, and inguinal glands. Subcutaneous injection is usually the first sign to attract attention in the plague-rat. The discovery of a bubo is almost invariably diagnostic of plague. The gland affected is surrounded with a zone of congestion. It is most often caseous. The liver in the plague-rat is yellow and is studded with innumerable pin-head whitish granules. Sometimes the viscus presents an appearance as if it had been peppered. Danysz' virus causes a somewhat similar change; the granules however, are larger. The spleen is enlarged, congested and occasionally granular.

Bilateral, serous or blood-stained, pleural effusion is found in 72 per cent. of plague-rats. These lesions may be recognised in the cadaver after decomposition has set in. If on microscopic examination of smears of the bubo and spleen bipolar bacilli and coccoid forms are seen, it is probable that the organism is the *B. pestis*. The bipolar appearance of this microbe is dependent on the technique of staining; too great stress should not be placed on this character. In agar cultures it grows as a short rod, or often like a coccus. If this medium contains 3 per cent. sodium chloride, large balloon-shaped bodies, great cocci, and objects resembling enormous trypanosomes are encountered. Its stalactitic growth in streptococcus-like chains in broth is characteristic. Litmus milk and glucose broth are rendered slightly acid; lactose broth is unchanged. To test the pathogenicity of the suspected culture, a little of it is rubbed into a shaven area of about one inch square of the abdomen of a guinea-pig or white rat. *B. pestis*, when inoculated in this manner, kills the guinea-pig within seven days, and the rat rather sooner. The survival, after such inoculation, of animals which have been immunized with anti-plague serum will confirm the diagnosis.

C. B.

UNDULANT FEVER.*

Distribution, Etiologie et Prophylaxie de la Fièvre Ondulante.—*Bull. Off. Intern. d'Hyg. Pub.* 1912. July. Vol. 4. No. 7. pp. 1180–1211.

This interesting paper brings our knowledge of undulant fever up to July 1912, and concisely states the results of recent work; it does not, however, include NÈGRE and RAYNAUD's work on the differentiation of the *M. paramelitensis* infections (*v. infra*).

A long list of synonyms is given, the most recent ones being *Melitococcie* (WIDAL), *Melitensis septicaemia* (EYRE), *Fièvre capricieuse* (NICOLLE), *Fièvre caprine* (DANTEC). The history of the disease and the review of the geographical distribution which is given may be summed up in the statement—Undulant fever has passed out of its ancient habitat, has radiated from the Mediterranean coasts to the interior of the continents, and is now to be found in every part of the world.

The only patricular point in the symptomatology that need be referred to is the high mononuclear increase found (70 to 80 per cent. NICOLLE). [This increase was usually found in cachectic sailors at Haslar when the disease was so common there, and attention was drawn to it by the reviewer. MENSE's *Handbuch der Tropenkrankheiten.*] CANTALOUBE gives the duration of the disease as six months.

In the Epidemiological section a useful table is given of the percentage of infected goats in different localities.

Authors.	Place.	Per cent. of goats infected.
Zammit...	Malta	50
Sergent...	Algeria	3·4
Nicolle...	Tunis	30·7
Conor & Huon...	Marseilles...	34·2
Aubert & Cantaloube...	St. Martial (Gard)	29·0

Mules, asses, horses, oxen, cows, rabbits, and fowls, besides goats, appear capable of propagating the disease (SERGENT). At Messina, of 70 oxen five were infected and of 40 cows five also. Rabbits can easily be infected by massive laboratory doses of *M. melitensis*, but not in small doses by the mouth or skin or by contact (CONOR); these animals appear to produce antibodies, but are not generally infective.

Four modes of infection are noted.—1. By the digestive system (the most common). 2. By the respiratory system (very rare). 3. By the cutaneous surface, in accidental or purposeful inoculations, or by insects (possible but negligible). 4. By the mucous surfaces, husband to wife and by prostitutes (possible).

Bacteriology.—The organism is described as a cocco-bacillus, having considerable vitality in urine, milk, and water. It produces a toxin which acts as a haemolysin (FIORENTINI), agglutinins which may last 4 to 10 years (ROGER), and specific serum useful for immunization (SICRE).

*** This name will be used in this journal in preference to Malta or Mediterranean fever.**

TRAMBUSTI and DONZELLO have used a nucleo-proteid vaccine with encouraging results, and dead bacterial vaccines have been sometimes effective (BASSETT-SMITH). SERGENT states that the practical value of serum therapy and vaccination against the virus of undulant fever has not been demonstrated.

Bacterial diagnosis comes under two headings: (1) Sero-reactions, a method which is considered trustworthy in spite of EUZIÈRE and ROGER's conclusions, (2) Haemo-culture, a very good but slower method.

The prophylactic measures recommended are, (1) Collective: Notification, isolation, disinfection, sterilizing milk and water, and good hygiene. (2) Individual: Cleanliness, prevention of infection from mother to child, etc. (3) Veterinary measures: Prevention of the importation of infected animals, observation of animals, inspection of stables, etc.

The general immunisation of goats against the fever is recommended (SIMOND). This is now being done with success by VINCENT and COLLIGNON.

The extension of the disease makes all measures of prophylaxis very important if its spread is to be controlled, but this is difficult. Some interesting copies of decrees which were issued at Tunis and in Algeria are added and a very good bibliography.

P. W. Bassett-Smith.

SERO-DIAGNOSIS.

NÈGRE (L.) et RAYNAUD (M.). (i.) **Etude de l'Agglutinabilité de Différentes Races de** *M. melitensis.*—*Compt. Rend. Soc. Biol.* 1912. May 3. Vol. 72. No. 15. pp. 664–665. (ii.) **Melitensis et Paramelitensis.**—*Ibid.* May 24. No. 18. pp. 791–793. (iii.) **Identification des Paramelitensis par l'Epreuve de la Saturation des Agglutinines.**—*Ibid.* July 5. No. 24. pp. 1052–1054.

i. This paper was written in reply to some articles by SOULIÉ, EUZIÈRE and ROGER. Experiments were carried out with five strains of *M. melitensis* obtained from Malta, Algeria, and Tunis. Emulsions were made from four day old cultures and 37 serums were tested before and after heating to 56° C. for half an hour; the results were observed microscopically, in a dilution of 1/10, after five hours at room temperature.

	Number of serums agglutinated.	
Strain.	Before heating.	After heating.
1	27	4
2	26	4
3	4	4
4	4	4
5	4	4

The authors found that certain strains were very easily agglutinated, not only by undulant fever serum, but by serum from patients with other diseases, and that some strains only reacted in very low dilutions with undulant fever serum. They express the view that these observations explain the very different and sometimes disconcerting results of other authors, and they strongly advocate heating the serum before use.

ii. Having shown in previous papers that certain strains of *M. melitensis* agglutinated with serum of cases of undulant fever in dilutions from 1/300 to 1/5000, both heated and unheated, they obtained a sixth strain (Br.) from Dr. C. NICOLLE in Tunis. This organism was culturally and morphologically identical with the other strains, but differed in its agglutinative properties. When tested with ten heated serums of cases suffering from the fever, it never agglutinated in a higher dilution than 1/50, which was only about a tenth of that of the other strains. A rabbit was immunised, and confirmatory results were obtained with its serum. Strain Br. was agglutinated up to 1/500 by its own anti-serum, but only up to 1/50 by other specific serums, while the other five strains were only slightly agglutinated with the serum produced by the Br. strain.

Similar agglutinative characters have been considered sufficiently distinctive to separate a *B. para-dysentericus* from *B. dysentericus*, and *para-meningococcus* from the true *meningococcus;* the formation of a *paramelitensis* group, therefore, is justifiable.

iii. A continuation of these experiments. Further proof of the distinctive character of the *paramelitensis* strain was obtained by a series of agglutinin absorption experiments.

(1) A rabbit was immunised with strain No. 1; the serum in a dilution of 1/10 was tested with an emulsion of strain No. 2; after 24 hours contact the sediment was removed and the clear diluted serum was tested with the five remaining strains; there was no agglutination with any of them; all the specific agglutinins had been removed.

(2) A dilution of the rabbit's serum was made as before and tested with an emulsion of strain Br.; the clear serum was after 24 hours tested with the other strains; they all agglutinated up to 1/100, that is to say, strain Br. (*M. paramelitensis*) had not removed all the agglutinins for the *M. melitensis.*

A second series of experiments was carried out, a rabbit being immunised with the *M. paramelitensis;* the results confirmed those of the first series.

The authors conclude that these agglutinin absorption experiments differentiate this organism from the five other strains, and justify the formation of a *M. paramelitensis* group.

P. W. B.-S.

NICOLLE (C.) and CONOR (A.). **Sur la Valeur du Sérodiagnostic de la Fièvre Méditerranéenne.**—*Arch. Inst. Pasteur Tunis.* 1912. No. 3. pp. 136–139.

The authors draw attention to the frequent errors that have resulted, even in their own laboratory, from sero-diagnostic reactions for undulant fever. They point out how the recent work of NÈGRE and RAYNAUD has provided an explanation of these errors, and has suggested methods to avoid them. They demonstrate the importance of removing the serum from the clot, if the blood is not to be examined at once; for after long contact with the clot the serum loses a great part of its agglutinative properties. The most common error, however, is the positive reaction obtained with non-undulant fever serum. By heating the serum to 56° C. for half an hour, the non-specific agglutinins are destroyed, leaving intact the specific agglutinins. They state that, by this simple modification, the value of the serum reaction in undulant fever is made certain. The use of a culture of *M. paramelitensis* is also a fruitful source of error, as shown by NÈGRE and RAYNAUD. They note the curious circumstance that, though the strain Br. (*M. paramelitensis*) was isolated by BRUCE, not until many years after was it recognised in the laboratory at Algiers as being a distinct organism; moreover, this strain has been widely distributed to other laboratories in Europe, thus causing many of the contradictory agglutinations which have thrown such doubts upon the value of the test.

They conclude by emphasising the specificity of the test for undulant fever when proper precautions are taken, and point out that we must recognise as distinct *M. paramelitensis*, causing a para-undulant fever.

P. W. B.-S.

MISSIROLI (Alberto). **La Fissazione del Complemento nella Febbre Mediterranea.** [Complement Fixation in Mediterranean Fever.] —*Policlinico.* Sez. medica. 1912. Sept. Vol. 19. No. 9. pp. 414–421.

In a previous paper the author demonstrated that some strains of *M. melitensis* will agglutinate with high dilutions of normal blood. In this paper he gives the results of some further experiments, both with the agglutination and complement fixation tests. For the Bordet-Gengou reaction he used two strains of the *M. melitensis*, one from Pisa and one from Krahl. That from Pisa was of little value; the Krahl strain, however, gave definite and satisfactory results, even in some cases in which the agglutination test failed. 42 serums were examined (in dilutions from 1 : 10 to 1 : 1000) for agglutination, and also for complement fixation. From his experiments he draws the following conclusions.—1. The blood of a case of Mediterranean fever contains an immune body suitable for complement fixation. 2. Contrary to what is affirmed by SICRE, these antibodies are not fixed equally well by all strains of *M. melitensis*. 3. In accordance with the views of PULVIRENTI and contrary to those of SICRE, the quantity of immune body corresponds with the quantity of the agglutinins. 4. The method of complement fixation has very little advantage over the agglutination test from a diagnostic point of view, particularly as different strains used as antigen give very divergent results.

P. W. B.-S.

UNDULANT FEVER IN SOUTH AFRICA.

i. BROWN (G. Minter). **Notes on Two Peculiar Cases of Malta Fever.**—*S. African Med. Rec.* 1912. July 13. Vol. 10. No. 13. pp. 275–276.

ii. ROBERTS (C. Dudley). **Notes on Three Cases of Malta Fever.**—*Ibid.* Aug. 10. No. 15. pp. 321–322.

iii. STRACHAN (P. D.). **Haemorrhage from the Bowel in Malta Fever.**—*Ibid.* Aug. 24. No. 16. pp. 346–347.

iv. MUIR (John). **Haemorrhage from Bowel in Malta Fever.**—*Ibid.* Oct. 12. No. 19. p. 423.

i. Two cases of doubtful undulant fever are recorded from the Transvaal by Brown. In one there was severe haemorrhage into the bowel and both ended fatally. The symptoms do not suggest a diagnosis of this fever. In one case only was a sero-diagnostic test made, and then from blood collected after death.

ii. Roberts gives details of three cases of fever attended with severe haemorrhage, which were under treatment in Kimberley Hospital. On post mortem examination, the first two cases showed suppurative conditions in the hepatic region, but no evidence of dysentery. The third case clinically resembled typhoid; about ten days before death the patient commenced to have intestinal haemorrhages, and at the post mortem ulcerations of the colon, cæcum, and small intestine were found. All these cases, one in a dilution as high as 1:200, gave positive serum reactions with the *M. melitensis.*

iii. Strachan, commenting on the above cases, points out that in undulant fever in Europe such severe haemorrhages have never been recorded, nor have they been observed by GARROW and himself during their large experience of the disease in South Africa. He draws attention to the fact that positive agglutinative reactions may, in some cases, continue for years after an attack, and therefore a positive reaction does not always mean a present infection. He states, however, that it is possible there may be some factor in the environment, or habits of life, of the people about Kimberley which tends to intensify the congestion said to be present in the alimentary canal during an attack of undulant fever.

iv. Muir records a case of continued fever, associated with diarrhœa and vomiting, in an adult near Cape Town; death occurred from the effects of a haemorrhage from the bowel about the 24th day. The blood was tested in the Public Health Laboratory at Cape Town and gave a positive reaction with *M. melitensis.*

[Haemorrhages of any extent are practically unknown in the European forms of undulant fever, and in some of these cases very marked pathological lesions were present which are quite distinct from those usually found in that disease. In others, *e.g.*, Muir's (the symptoms of which suggest typhoid) the man may have had a previous undulant fever infection. Bearing in mind the frequent errors that have occurred from serum diagnosis reactions

taken alone, further proof of the presence of the *M. melitensis* is requisite before accepting the diagnosis of undulant fever.]

P. W. B.-S.

MUIR (J.). **Malta Fever in the Goat: a Veterinary Note.**—*S. African Med. Rec.* 1912. Sept. 14. Vol. 10. No. 17. pp. 372–373.

The author gives some notes showing the co-incidence of disease in goats, due to the *M. melitensis*, and in the country people employing them. He describes the way in which many herds are affected in South Africa, the goats having marked arthritic symptoms; and he draws attention to the important fact that these infected goats are widely dispersed in the country at the stock fairs.

P. W. B.-S.

TREATMENT.

NATALE (Salvatore). **Contributo alla Terapia della Febbre Mediterranea col Siero Trambusti-Donzello.** [The Treatment of Mediterranean Fever with Trambusti-Donzello Serum.]—*Policlinico.* Sez. pratica. 1912. June 30. Vol. 19. No. 27. p. 983.

This article communicates the results obtained by the use of Trambusti-Donzello's anti-*melitensis* serum in undulant fever cases. Case 1—An infant suffering from a typical remittent type of fever giving a positive (1:500) serum reaction was treated with 10 cc. of the serum, repeated in 24 hours; after three days the child recovered. Case 2, aged 25 years, suffered from an intermittent type of fever, with enlarged spleen. Quinine was not effective, and a positive serum reaction with *M. melitensis* was obtained. After injections of anti-serum the patient made a rapid recovery. Case 3—A lady suffering from a mixed infection of undulant fever and tuberculosis. A positive serum reaction (1:80) was obtained. The anti-serum was given, after which the fever underwent a marked modification, the temperature falling from 40°·7 C. to 36° C. and then running an irregular course; later an inflammatory focus was found under the left scapula, and this responded to tuberculin injections. Though the serum therapy in the last case was not successful, as was natural in a mixed infection, yet it was considered to have been beneficial, and to have given the anti-tubercular treatment a better chance.

[As anti-melitensis serums have not been successful in other hands, we look forward to the results of further experience with this serum.]

P. W. B.-S.

UNCLASSED.

LUNA (Francesco). **Contributo alla Conoscenza della Febbre Mediterranea nei Lattanti.** [Mediterranean Fever in Sucklings.]—*Riforma Medica.* 1912. June 15. Vol. 28. No. 24. pp. 646–647.

The author describes three cases of undulant fever at Palermo in infants at the breast. He states that such cases have been but little studied, and that probably many are never recognised. The symptoms are not distinctive. From the blood counts, which are given, it is not possible to draw any deductions, as the variations are so great in children.

The agglutination was positive at 1:1000 (twice) and 1:200.

P. W. B.-S.

VÉLEZ (L. R.). **La Fièvre de Malta existe au Pérou.** [Correspondance.]—*Bull. Soc. Path. Exot.* 1912. July. Vol. 5. No. 7. p. 454.

The author makes a short statement that in the valley of Chicama, Peru, he diagnosed undulant fever by cultural methods and sero-diagnostic reactions. In 1909 Dr. BARTON at Lima attributed a number of infective fevers in infants to this cause.

P. W. B.-S.

BARRÉ (Emile). **Les Complications Hépatique de la Fièvre de Malte.**—Université de Montpellier. Faculté de Médecine. *Thèse.* No. 63. 1912. July 4. 35 pp. Montpellier. Imprimerie Coopérative Ouvrière.

In this thesis are discussed the hepatic complications rarely found in the course of undulant fever. The author quotes fully cases described by LAGRIFFOUL and ROGER, RAUZIER and ROGER, EYRE and FAWCETT, and others.

P. W. B.-S.

MISSIROLI (Alberto). **Influenza dei Portatori di Germi nella Diffusione della Febbre Mediterranea.** [The Influence of Carriers in Diffusion of the Germ of Mediterranean Fever.] *Riforma Medica.* 1912. Aug. 10. Vol. 28. No. 32. pp. 869–874. With 5 charts.

In 1892 GAFFKY proved the existence of carriers of cholera during the epidemic at Hamburg. SHAW drew attention to the same danger in the case of undulant fever in Malta. Epidemics have occurred elsewhere in which the disease could not be traced to infected goat's milk. The author describes an epidemic of undulant fever which continued to spread after prophylactic measures with regard to milk etc. had been taken. The blood of twenty apparently healthy men was examined. Of these four gave positive agglutination reactions (1/10—1/1000). In one the *M. melitensis* was isolated from the blood; five days afterwards a slight fever set in, with the usual symptoms of undulant fever in 15 days.

[The detection of these carriers or ambulant cases is important because they may act as centres of infection, producing epidemics in an endemic area.]

P. W. B.-S.

i. LEGER (Marcel) et DOMINICI-URBANI (Ch.). **Foyer de Mélitococcie en Corse.**—*Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 657–667.

ii. ZUCCARELLI. **Fièvre Méditerranéenne en Corse.** [Correspondance.]—*Ibid.* pp. 566–567.

i. The authors give an interesting description of an epidemic of undulant fever in Corsica. Sporadic cases were first noted in 1910 by BOURGUET. The disease is most commonly met with in that prosperous part of the island around Bastia where a large export trade of milk, cheese, etc. exists. Milk is undoubtedly the commonest means of infection, but DARBOIS has shown that cheese made of contaminated milk may be infective for three weeks. Twenty-six cases were observed, 18 of which were in women. Sero-diagnostic tests were applied to all; three strains of the *M. melitensis*, living and dead, were used. Differences in the results of the three were noted, and paradoxical reactions occurred. The goats, owing to deficiency of pasture, are at certain seasons allowed to mix together, and thus infection is spread from one herd to another. In the autumn of 1911 it was noticed that many of the goats showed signs of illness; mammitis and abortions were common.

The authors describe vividly the seriousness of the conditions observed at one of their visits to a herd of animals. Several of the flock were affected, the sheep dog was extremely ill, and the shepherd also had the fever. Of the herd of 200 goats, the blood of 35 gave 22 positive reactions, as did that of the dog and the shepherd. There is a definite connection between the endemic in the goats and that of the peasants. Nearly all those affected were working with the goats, but the authors state that three times within their knowledge the infection was inter-human, conveyed by dirty hands—not by ingestion of infected milk.

ii. Zuccarelli draws attention to the increasing evidence of the presence of infected goats and people in Corsica, and strongly advocates that measures should be taken, similar to those in Algeria, to prevent importation of infected goats, and the sale of milk from animals already diseased, with notification of all cases of disease in the island, etc.

P. W. B.-S.

FILARIASIS.

TROPICAL AFRICA.

THIROUX (A.). **Les Filaires Embryonnaires du Sang des Indigènes de l'Afrique Occidentale Française.**—*Bull. Soc. Path. Exot.* 1912. June. Vol. 5. No. 6. pp. 438–445. With a map.

The natives examined were soldiers from different parts of French West Africa. The author examined the blood in a fresh state direct and after centrifuging. As regards filarial periodicity in these districts he found that it was very badly marked in the case of *Filaria nocturna*: for example, in 44 per cent. of the cases this filaria was observed indifferently during the day and night, in 42 per cent. of the cases it was seen only at night, whilst finally in 13 per cent. in which no embryos had been found by a simple examination during the night, they were, nevertheless, discovered during the day, but only after the blood had been centrifuged twice. In some cases of *Filaria perstans* there seemed to be a tendency to a nocturnal periodicity and sometimes these embryos were found by a direct examination at night, even though they had not been discovered in blood which had been twice centrifuged during the day. The morphological characters of the filariae found closely resemble those described by other authors. The geographical distribution of *F. nocturna*, *F. perstans* and *F. diurna* in the districts under discussion showed that the two former were very common while the latter was rare. The rarity of *Filaria diurna* corresponded closely with a similar rarity of *Filaria loa.* This parasite would seem to diminish rapidly in frequency as one proceeds north PROUT, for example, never having found it in Sierra Leone except in two natives who had come from the Congo.

G. C. LOW.

CAZANOVE (Dr.). **Considérations sur la Filariose dans le Bataillon des Troupes Noires d'Algérie (1910–1911).**—*Ann. d'Hyg. et Med. Colon.* 1912. July–Aug.–Sept. Vol. 5. No. 3. pp. 555–593.

The author gives some interesting statistics regarding the prevalence of filariasis in a battalion of black troops employed in Algeria. These natives had been recruited from different parts of French West Africa, namely from Mauretania, Upper Senegal and Niger, Casamance and Upper Gambia, Guinea, Ivory Coast, and Equatorial Africa. The percentage infected is seen below.

Companies.	Number of men examined.	Number with filariae.	Per cent.	Occurring in the blood		
				Day and night.	Day alone.	Night alone.
1st company	187	58	31·01	13	2	43
2nd ,,	186	57	30·64	9	2	46
3rd ,,	190	49	25·79	16	1	32
4th ,,	191	64	33·50	15	3	46
Total...	754	228	30·24			

Day and night examinations further revealed the fact that embryos with a purely diurnal periodicity were rare; in the vast majority of cases they occurred in the blood by day and night or by night alone.

The results of the examination of the wives and other females attached to the troops are striking, as they give a much lower rate of infection than for the men.

Companies.	Number of women examined.	Number with filariae.	Per cent.
1st company	112	14	12·5
2nd "	76	8	10
3rd "	85	10	12·7
4th "	78	10	12·8

Looking at the subject from the geographical point of view, the following are the percentages of infection in the different areas from which the men came:—

	Per cent.
Upper Senegal and Niger (région saharienne)	31·34
Mauretania	32·61
Upper Senegal and Niger (région soudanaise)...	33·02
Upper Senegal and Niger (région sahélienne)...	35·07
Guinea	38·40
Casamance, Upper Gambia	45·28
Ivory Coast	48·64
Congo	71·05

The manner in which infection takes place is next discussed and finally the physical state of those affected. The author sums up his researches in the following general conclusions:—

1. According to the statistics about one third of the men in a battalion of Senegalese soldiers, formed in 1910, are infected with filariae.

2. All the districts of French West Africa and French Equatorial Africa are prone to such infections, differing to some extent but fairly comparable.

3. The direct inoculation of the filaria by the puncture of mosquitos does not appear to him to be the only method of infection.

4. The presence of the filariae in the blood of the Senegalese soldiers did not appear sensibly to influence them in their fitness for service.

[The specific names of the filariae found are not mentioned in the paper, but it seems probable from the text that the infections were chiefly due to *Filaria bancrofti* and that in some instances the parasite did not appear to have any definite periodicity. Unfortunately many of the soldiers had served on the Congo and other areas where *Filaria perstans* is found; the possibility of some of them being infected with this parasite is of course very strong and cannot be overlooked in estimating the value of Cazanove's work.]

G. C. L.

LEGER (André). **La Filariose Humaine dans le Haut-Sénégal et Niger. Index Endémique de la Région de Bamako.**—*Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 618–622.

Leger gives the endemic index of filariasis among the indigenes in the region of Bamako in the Upper Senegal and Niger district; it was found to be high. The embryos most frequently met with were *Filaria perstans* and *F. bancrofti*. *F. diurna* on the contrary was very rare, the percentage being of little importance.

Animal filariae were equally prevalent, embryos being found in the blood of calves, dogs, hyaenas and in a large proportion of birds.

The following tables, compiled by Leger, show the percentages of the different filariae at a glance:—

Table 1. Filarial Index during the rainy season (Adults).

Number examined.		Number with Filariae.					
		F. bancrofti.	Per cent.	*F. diurna.*	Per cent.	*F. perstans.*	Per cent.
953	A. Examined at midnight, 428.	61	14·25	0	0	54	12·38
	B. Examined at mid-day, 525.	0	0	4	0·75	57	10·80

Table 2. Filarial Index during the dry season (Adults).

Number examined.		Number with Filariae.					
		F. bancrofti.	Per cent.	*F. diurna.*	Per cent.	*F. perstans.*	Per cent.
725	A. Examined at midnight, 309.	35	11·30	0	0	42	13·55
	B. Examined at mid-day, 416.	0	0	2	0·48	39	9·38

Table 3. Filarial Index for children from eight to fifteen years.

Number examined.		Number with Filariae.					
		F. bancrofti.	Per cent.	*F. diurna.*	Per cent.	*F. perstans.*	Per cent.
315	A. Examined at midnight, 187.	7	3·73	0	0	15	8·02
	B. Examined at mid-day, 128.	0	0	0	0	6	4·68

G. C. L.

VERDUN (P.) and BRUYANT (L.). **Quelques Documents pour Servir à l'Étude de la Filaire loa.**—*Bull. Soc. Path. Exot.* 1912. July. Vol. 5. No. 7. pp. 506–508.

The authors state that the duration of the development of *Filaria loa*, its longevity, and the progress of the symptoms it produces are still by no means clear; they therefore report the following case, as helping to throw light on some of these points.

A young man went out to the West Coast of Africa and stayed a year and fifteen days (February, 1907, to March, 1908) near Bangui on the Upper Oubangui. Blackwater fever developed and he returned to France in July, 1908. The first manifestations of filariasis showed themselves about the middle of the following month when a pruriginous oedema of the penis appeared, lasting for three or four days. This symptom disappeared but recurred at intervals up to the end of October, to be followed later by evanescent swelling of the front and insides of the thighs.

In July-August, 1909, the site of the oedema changed, fugitive itchy swellings appearing on the back, the upper arm, the wrists and hands. The general state remained good. In the autumn of 1909 ocular troubles appeared for the first time, the patient having a sensation of something moving near his right eye, and these sensations becoming more troublesome, in the following year (1910) he consulted an oculist who removed a male adult *Filaria loa*. Before this operation the authors examined the patient's blood and found a very pronounced eosinophilia. In very numerous blood examinations but one microfilaria was seen, all others being negative.

The authors state that the period of incubation, from the time of infection by *F. loa* to the appearance of the first symptoms, is generally regarded as a long one, even up to thirteen years. In this case the minimum period was five months, the maximum seventeen, giving an average of eleven months, a period corresponding to figures given by WARD. As regards the development of the filaria this again is said to take a very long time, but in the case above quoted an adult male worm was extracted twenty-two months after the first skin swellings had been seen. A high eosinophilia persisted after this, indicating the presence of other adult forms either under the skin or in the deeper parts of the body.

The authors explain the practical absence of embryos by suggesting that the number of females was small, or that these were for the most part immature, or that they were not fertilised at the moment of examination.

[It is doubtful whether any of these explanations will suffice. The absence of embryos in definite *Filaria loa* infections is by no means uncommon, and it almost looks as if the authors' was a case of this kind, the finding of only a single embryo suggesting the possibility of some error in diagnosis.]

G. C. L.

SOUTH SEA ISLANDS.

FÜLLEBORN (F.). **Über Mikrofilarien des Menschen im deutschen Südsee-Gebiet und deren "Turnus," nebst Bemerkungen über die klinischen Manifestationen der dortigen Filariasis.** [The Human Microfilariae of the German South Sea Islands and their Periodicity, with Remarks on the Clinical Symptoms.]—*Arch. f. Schiffs u. Trop. Hyg.* 1912. Aug. Vol. 16. No. 16. pp. 533–547. With a map.

The author refers to the presence of embryonic filariae in the Pacific Islands with and without nocturnal periodicity. These cannot be differentiated by a comparison of their minute anatomy and body proportions, and, as BAHR and LEIPER have pointed out, the adult worms of the non-periodic Fijian microfilariae are identical anatomically with specimens of *Filaria bancrofti* from other parts of the world. It would appear then that there are two biological varieties of *F. bancrofti*, one producing young with no periodicity, the other young with a nocturnal periodicity. The question is complicated and the author refers to the theories of THORPE and BAHR which have been brought forward to explain it. THORPE's idea was that the embryos were found in the peripheral blood both by day and by night on account of the irregular habits of the people, BAHR's that their presence by day might be explained by the fact that their chief intermediate host, at least for Fiji, is a day feeding mosquito, *Stegomyia pseudoscutellaris*.

The author made use of an excellent opportunity to prove or disprove the first of these views. He was allowed to examine the blood of a troop of Samoan natives appearing at the Zoological Gardens at Hamburg and found that about half had filarial embryos, identical with those of *F. bancrofti*, in their blood. These were found in almost equal numbers by day and by night, and this state of affairs persisted when the persons infected slept peacefully all night which previously they had been unable to do. This therefore does away with the idea of irregularities in sleep having anything to do with the altered periodicity. Of these Samoans the sexes were equally infected; the youngest child with positive blood findings was four years of age.

During the South Sea expedition of the "Hamburgische Wissenschaftliche Stiftung 1908/09" Fülleborn had an opportunity of examining the blood of natives in some of the islands of the Bismarck Archipelago and German New Guinea. 400 specimens of blood taken according to the thick film method were obtained. These examinations showed that a very high percentage of the inhabitants were infected with filariasis (*Filaria bancrofti*) and that the larval or embryonic forms of these areas, in contradistinction to those of Samoa, Fiji and other places, possessed a well marked nocturnal periodicity.

A similar state of affairs was found in Amboina and Celebes, namely embryos with a nocturnal periodicity, while in Ponape and Yap (Caroline Is.) in a very limited number of examinations no embryos were found.

Fülleborn now believes that after the work of Bahr in Fiji there should no longer be any doubt about the connection between filariasis and elephantiasis. Elephantiasis of the lower extremities and filarial glands, he says, occur in the islands of the Bismarck Archipelago and in German New Guinea and in many places are very frequent. He did not see cases in which the upper arms were affected. In other parts he did not meet with the disease at all, even although a marked *bancrofti* infection existed. Enlargements of the inguinal glands were very common especially in Singor and Bo, two places on the Maclay coast of German New Guinea. These glands were not hard as a rule, but formed soft masses (varicose groin glands); they were met with in eleven out of twenty-five people examined.

[This paper is very interesting, for it extends our knowledge of the habits of the filariae in the different Pacific Islands. The irregularity of periodicity in Samoa and Fiji has long been known and it is possible, as Bahr thinks, that the fact of the chief intermediate host being a day feeding mosquito may have something to do with this peculiarity. It would be interesting to determine the intermediate host in the Bismarck Archipelago and German New Guinea where, as Fülleborn has shown, a nocturnal periodicity exists. Fülleborn's blood examinations are perhaps rather few to draw definite conclusions from and extended observations may easily modify some of his results. Very probably cases of infection will be found in Ponape and Yap, and elephantiasis patients in the areas where he describes heavy infections with *bancrofti* larvae. Already in a subnote to his paper he states that elephantiasis of the breast occurs in German New Guinea, Dr. Dempwolff having sent him a photograph of such a patient.]

G. C. L.

UNCLASSED.

Fülleborn (F.). **Untersuchungen über Filarien.** [Researches on Filariae.]—*Beihefte zum Arch. f. Schiffs- u. Trop. Hyg.* 1912. May. Vol. 16. Beiheft 4. pp. 153–154 [439–440].

The author believes that the common distinction between the embryos of *F. bancrofti* and *F. loa* (*diurna*), according to the way they become stretched out in dried films, is not reliable because in the damp night air of the tropics microfilariae of the *bancrofti* type can take up similar attitudes to those of *diurna*. A good means of discriminating between the two, according to the author, is the position of the last nuclei at the tail end when treated with prolonged haematoxylin staining. In *diurna* these extend to the extreme end of the tail; in *bancrofti* only to 95 per cent. of the length of the worm. Better than this however is Rodenwaldt's method of vital staining with Azur II; or the usual dried smears may be stained with Azur II and then differentiated with glycerin ether mixture. Again, good results can be obtained by this last-mentioned technique, especially if the smears are fixed when in a wet state by hot alcohol as recommended by Looss. The vital staining procedure clearly shows that the so-called *Filaria diurna* embryos are absolutely identical with those of *Filaria loa.*

Another interesting piece of filarial work is the experiment of inoculating blood rich in filarial embryos into uninfected animals. Such an experiment by GRUBY has shown that dog microfilariae have remained alive in the lungs for at least three years. During this time they increased considerably in size, but they did not show any of the developmental changes which take place in the Malpighian tubes of the mosquito.

Experiments suggested by the good results WELLMAN has obtained in chyluria by the use of the X rays were carried out by Fülleborn on dogs. The rays seemed to have a prejudicial effect on the sexual forms of the *Filaria immitis* in the dog's heart, but owing to the scarcity of the material the results cannot be taken as conclusive and the work will have to be repeated.

G. C. L.

FÜLLEBORN (F.). **Untersuchungen über die chemotaktische Wirkung der Malpighischen Gefässe von Stechmücken auf Hundemikrofilarien.** [The Chemotactic Action of the Malpighian Vessels of Mosquitoes on the Microfilaria of the Dog.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1912. July 17. Vol. 65. Nos. 4–5. pp. 349–352.

The author conducted an interesting experiment to determine whether the Malpighian tubes of the mosquito have any chemotactic action on the embryonic filariae of the dog. A large drop of blood, heavily infected with microfilariae, was put on a slide and the open ends of two capillary tubes—one filled with pure salt solution 4 per cent., the other with salt solution and crushed Malpighian tubes from a mosquito (*Anopheles maculipennis*)—were inserted into this, the whole being covered with a cover glass and ringed round with vaseline. The specimen was kept for 20 hours at a constant temperature of about 25° C. and then examined to see if any microfilariae had entered the tubes. Unfortunately a certain amount of blood is drawn into the tubes under such conditions and this of course makes the correct reckoning difficult, but even allowing for this a much larger proportion of embryos was found in the tube containing Malpighian extract. This indicates, therefore, that the Malpighian tubes of the mosquito have some power, chemical or otherwise, of drawing the young filariae to them.

G. C. L.

FÜLLEBORN (F.). **Beiträge zur Biologie der Filarien.**—*Centralbl. f. Bakt.* 1. Abt. Orig. 1912. Sept. 19. Vol. 66. Nos. 2–4. pp. 255–267. With 1 plate and curve.

In this paper the author first refers to the transference of microfilariae from an infected to a healthy animal. He mentions GRUBY and DELAFOND's experiments in this connection (*v. supra*), and describes one carried out by himself. He inoculated an uninfected puppy with embryos of *Dirofilaria repens* (Railliet) and at subsequent dates examined its peripheral blood. At first some of these forms were recovered, but later none could be found. Eventually, two and three quarter years after the inoculation, the dog was killed and microfilariae, much greater in size than those of the original dog, were easily demonstrated in its lungs. No adults or developing forms were found in its connective tissues or heart, this indicating that no natural reinfection with metamorphosed mosquito forms had taken place. The recovered embryos measured on an average 413·2μ in length, that is, about double the length of the ordinary embryonic forms of *Dirofilaria repens* and they were somewhat broader. No changes analogous to those occurring in embryos developing in the Malpighian tubes of mosquitoes were seen. A similar experiment with mice showed that the same dog microfilariae would remain alive in the lungs of these rodents for at least 67 days. Human microfilariae, however (*F. bancrofti*, *F. loa*, *F. perstans*), injected into mice and monkeys always gave negative results, as regards their recovery both in the peripheral and lung blood.

Experiments indicating the influence of drying, freezing, osmotic pressure, effects of light, X rays, and the electric current on the embryos are described and the periodicity of the embryonic form of *Filaria loa* (*Microfilaria diurna*) is discussed. Some results of attempts to infect insects (mosquitoes) with the embryos of *Filaria perstans*, *F. loa*, and some of the dog filariae are also given. Migration to the muscles was noted and a certain degree of development.

The second part of the paper deals with transplantation experiments with developing filariae from an infected to a second dog. Five developing *Dirofilaria repens* were implanted in a healthy dog and its blood was examined afterwards to determine if embryonic forms appeared in it. Positive results were obtained in two and a half months; after five months, however, embryos became very scarce and after nine months they had disappeared altogether. The dog died one year after the transplantation and neither embryos nor adults were then found, the infection having died out.

[The paper is a useful one as it brings together much of FÜLLEBORN's work on filariasis. Many of the experiments have been published before. The attempts to infect mosquitoes with embryos of *F. perstans*, though interesting, are of course in no way conclusive.]

G. C. L.

LOW (George C.). **A Note on the Pathology of Chyluria.**—*Jl. London School of Trop. Med.* 1912. July. Vol. 1. No. 3. pp. 243–250.

The author describes the examination of the urine of a patient believed to be suffering from chyluria. The examination, however, revealed the fact that there was an apparent absence of fat in the specimen, an absence already noted by WISE in similar cases in British Guiana. Microscopically, small lymphocytes formed the chief cell constituent of the urine.

At a later date an opportunity occurred of working out the pathology of a similar case, an autopsy having been obtained on a patient who had died in the midst of an attack, of what to all intents and purposes was chyluria.

A careful dissection, however, revealed the fact that the thoracic duct was perfectly normal from its termination at the junction of the left subclavian and internal jugular veins right down through the thorax to the receptaculum chyli. The milky fluid passed during life was not, therefore, coming from there.

The left kidney was somewhat enlarged and on the organ being split through from the outer surface to the pelvis, much reddish-tinged milk-like fluid escaped from its substance, the pelvis also being full. Around and near the pelvis were gaping vessels, the orifices of dilated lymphatics. The right kidney was smaller than the left. On section the same kind of fluid as was found in the left escaped but in very much smaller quantities, the lymphatic leakage being much slighter. The left ureter was considerably dilated with a much thickened wall, this condition beginning at and involving the left pelvis and extending down to the bladder. The opening into the bladder was quite patent and no cause of obstruction, such as a calculus, could be found. The right ureter appeared normal and there was no dilatation of the pelvis. Both ureters were full of haemato-lymph. The bladder was distended and when it was opened blood and lymph similar to that passed during life and to that found in both kidneys poured out. After all the fluid had drained away many large gelatinous masses remained, these having been chiefly responsible for the dilatation of the viscus. The wall of the organ was much hypertrophied and the mucous membrane was injected. Near the fundus there was an area covered with blood and when this was washed away the mucosa was seen to be raised into a series of minute, almost villous-like, projections.

An examination of the fluid from the bladder, ureters and kidneys showed that this consisted of blood and lymph, practically no fat being present, so that the condition correctly designated was a haemato-lymphuria and not a chyluria.

An exhaustive search was made both for adult and embryonic filariae; the results showed that all active infection had died out, the pathological lesions produced by the filariae alone remaining. No living adult filariae were found, but that they had been abundantly present at one time was evidenced by their calcified remains, several being found in the wall of the hydrocele sac and five in the pelvis of the right kidney. It was almost certain that other similar remains were lying in other situations, but none were actually found. Further, no embryonic filariae were found anywhere, this again indicating that all the adult forms were dead. Blood from many different situations was carefully searched for these, as was also lymph from many glands, and the haemato-lymph from the kidneys, ureters and bladder.

The microscopical examination of the tissues bore out the macroscopical appearances, dilated lymphatics being easily seen in the sections of the kidneys, ureters and bladder.

From an anlysis of these different points the author concludes that it is altogether erroneous to call all cases of milky urine chyluria. The two described were in reality cases of lymphuria, the second one in addition showing much blood, *i.e.*, a condition of haemato-lymphuria. He therefore believes that the term lymphuria will have to be used in the future for similar cases in contradistinction to chyluria, and that in all probability such cases will be found to be much more frequent than is generally supposed. The lymph may come from any part of the urinary tract, depending of course on where the blockage of the lymphatic trunks is situated. In the case under discussion this must have been extensive, as both sides were involved. Probably the main block was in the juxta-aortic glands adjacent to the kidneys or in the efferents from these on their way to the thoracic duct.

G. C. L.

WELLMAN (Creighton) and JOHNS (Foster Mathew). **The Artificial Culture of Filarial Embryos. A Preliminary Note.**—*Jl. Amer. Med. Assoc.* 1912. Oct. 26. Vol. 59. No. 17. pp. 1531–1532.

The authors state that they have attempted the nurture in artificial media of the embryos of *Filaria immitis* (Leidy). Embryos of this species were found to live for ten or twelve days in specimens of sterile defibrinated dog's blood at room temperature (28° C.) and considerable increase in size occurred, the parasites growing to one and two thirds their former dimensions. Other media were also employed, the best results being obtained with dextrose dog serum at low temperatures. With this medium life was prolonged from twelve days to two weeks and the parasites became from two to two and one third times as long as when planted.

The suggestion is put forward that by these methods the embryo filariae were nurtured to a point which corresponds with the limit of their development in the digestive tract of the mosquito and that ultimately they might be carried to sufficient maturity to infect animals.

[Against such a hypothesis is the fact that the embryo filariae do not increase in length in the stomach of the mosquito, but pass directly into the Malpighian tubes. Further, the first change in their metamorphosis is an increase of breadth, not of length.]

G. C. L.

FILARIASIS IN THE BRITISH WEST COAST COLONIES.

Northern Nigeria.—In the annual medical and sanitary report for the year ending 31st December, 1911, no case was returned as filariasis. Seven European cases were returned as lymphangitis; 186 native cases were returned under diseases of the lymphatic system; twenty European and 225 native cases were returned as pyrexia of uncertain origin; and two native cases were returned as suffering from a nematode infection. Having regard to the known prevalence of filariasis in the Protectorate Dr. BLAIR considers it is fair to suppose that many of the above mentioned cases were examples of it.

Southern Nigeria.—In the annual report on the Medical Department of Southern Nigeria for the year 1911 the statement is made that only 22 cases of filariasis came under observation in the whole Colony during the year. It is further stated that several Europeans in the Colony are known to harbour *Filaria loa* with apparently very little inconvenience to themselves.

[These figures are apt to be misleading. Infections with *F. bancrofti*, *F. loa* and *F. perstans* are very common in that part of West Africa and if properly looked for would easily be found. Symptoms of course are not always present even in *F. bancrofti* infections.]

Sierra Leone.—In the annual report on the Medical Department of Sierra Leone for the year ending 31st December, 1911, it is stated that Dr. McConaghy examined one hundred slides of night blood taken from school boys at a place called Bo. Embryonic forms of *Filaria bancrofti* were found in ten of these (ten per cent.), embryonic forms of *Filaria perstans* in one (one per cent.).

[If medical officers in the different districts of West Africa recorded similar observations, a general idea of the prevalence of filariasis could be obtained. The day blood should be taken as well as the night blood and as large a number of individuals as possible examined.]

G. C. L.

ELEPHANTIASIS.

Pelletier (J.). **Cas d'Eléphantiasis du Scrotum observés au Sénégal.**—*Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 625–627.

Elephantiasis is relatively common amongst the black population of Senegal. The author has operated upon seven cases of elephantiasis of the scrotum, the weight of the tumours varying from 2 to 100 kilos. The enormous size which they may attain is well shown in a series of photographs of a native afflicted with this disease; when he was standing the mass rested on the ground. Another photograph shows the very satisfactory result of the operation for removal. For these large tumour masses Pelletier proposes to modify the operation usually in vogue. He gives a description of the different steps he proposes.

G. C. L.

Madden (Frank Cole), Ibrahim (Aly) and Ferguson (A. R.). **On the Treatment of Elephantiasis of the Legs by Lymphangioplasty.**—*Brit. Med. Jl.* 1912. Nov. 2. pp. 1212–1214.

Handley's operation of lymphangioplasty for the cure of elephantiasis was repeated under favourable circumstances in Cairo. Handley in a summary of his own work wrote: "To my mind lymphangioplasty has failed to establish its position in the treatment of elephantiasis." He believed that gravity nullified the results as much as anything else. The clinical results of the authors are in harmony with those of Handley, but they find in addition that the artificial lymph channels do not persist for any length of time and that there is finally an obstruction to lymph return from the obliteration of lymphatics in the neighbourhood of the inserted threads. A record of eight cases is given, and an account of a series of experimental lymphangioplasties in healthy guinea pigs.

The writers' conclusions are as follows:—

"1. Clinically, it is abundantly evident that lymphangioplasty fails to effect anything but a very temporary improvement in elephantiasis of the legs. The swelling is very markedly reduced within 48 hours after the operation; but the improvement persists only so long as the recumbent position is maintained. Within at most 21 days after the operation, or as soon as the patient begins to walk, the swelling invariably returns and no permanent improvement results.

"2. The examination of the tissues surrounding threads introduced during the operation of lymphangioplasty in cases of elephantiasis, and also around threads introduced into healthy tissues of man and of guinea-pigs, supplies very adequate reasons for the failure of the operation.

"Important as the action of gravity may be in contributing to the failure to maintain a new artificial lymphatic circulation, it appears that this want of success is due in far greater degree to definite reactive changes in the tissues immediately around the thread, which soon isolate the new lymph tube from the surrounding lymphatic areas and eventually completely obliterate it.

"Briefly the series of changes in the tissues around buried longitudinal threads in the subcutaneous tissues are as follows:—

"1. For a short time the threads, by virtue of their capillary action, drain the surrounding tissues of the lymph contained in them.

"2. The threads in the tissues soon excite a definite cellular reaction, which leads comparatively soon—from 14 to 21 days—to the formation of a dense and progressively contracting fibrous tissue. This walls off the thread and crushes the adjacent lymphatics out of existence, and thus effectually prevents any absorption of fluid into the space immediately around the thread itself. These fibrous changes, occurring around the ends of the thread, as well as along its whole length, eventually completely isolate it, and it may then perhaps be compared to a long worm lying within an impermeable sheath.

"3. The thread is later penetrated by rows of cells, running in along its fibrils, which must eventually lead to its complete disintegration; and the formation of a solid column of dense fibrous tissue along which no absorption of fluid of any kind can possibly occur."

G. C. L.

KONDOLEON (Emm.). **Die operative Behandlung der elephantiastischen Ödeme.** [Operative Treatment of Elephantiasis].—*Zentralblatt f. Chirurgie.* 1912. July 27. Vol. 39. No. 30. pp. 1022–1025.

The author describes the operations of MIKULICZ, LANZ, and HANDLEY for this condition and gives the details of one devised by himself. His studies on the pathology of the disease have led him to the conclusion that the lymph stasis chiefly occurs in the fascia and therefore that this is the tissue that should be removed, so as to make a broad communication between the subcutaneous tissues and the muscles. It is of course impossible to remove the whole of the thickened fascia in a case of elephantiasis of the leg, but long strips on the outer and inner sides may be suitably excised. He describes the details of the operation and states that the results (six cases) were satisfactory. The cases, all non-tropical, were seen in Athens. Their etiology differed considerably. Two followed a purulent inflammation of the feet, one erysipelas of the leg, one healed tubercle of the knee joint, one a total extirpation of the inguinal glands, while in the last no cause was determined.

[The etiology of these non-tropical cases of elephantiasis is interesting. Surgeons have conducted very similar operations to those described by the author on filarial cases in the tropics, but the results cannot be said to have been generally satisfactory. No mention of these is made in the paper.]

G. C. L.

HUNTER (Walter K.). **Note on a Case of Elephantiasis occurring in this Country.**—*Glasgow Med. Jl.* 1912. Sept. Vol. 78. No. 3. pp. 166–169. With 1 plate.

A case of elephantiasis occurring in a woman who had never been out of Britain is here described. The patient, aged 61, had suffered for about thirty years, the condition having first appeared after repeated attacks of erysipelas. Syphilis also was probable. Both legs were very greatly increased in size and swollen in such a way as to alter their general contour considerably. The subcutaneous tissue was dense and firm, and did not pit on pressure. Ascites was also present, necessitating paracentesis. This had to be repeated and ultimately the patient died, about one month and a half after her admission to hospital.

The autopsy showed that the aortic and mitral cusps were thickened and atheromatous; early atheromatous changes were present also in the coronary arteries, and the lungs were congested and emphysematous. The abdominal cavity contained a thin purulent fluid; the liver was slightly enlarged with a roughened surface; the spleen was greatly enlarged and its capsule was much thickened; dense firm adhesions existed round both organs. The retro-peritoneal glands were enlarged. Sections of the skin from the lower limbs showed a hyperplasia of the subcutaneous tissue; there was no thickening of the epidermis, and the *cutis vera* was not unduly fibrous; here and there small collections of mononuclear cells could be seen.

[Non-filarial elephantiasis cases, such as the above, are met with from time to time in England and in other non-tropical countries. Erysipelas, especially if recurring, is one of the chief causes, but in some cases the origin cannot be detected during life.]

G. C. L.

FILARIASIS IN ANIMALS.

PLIMMER (H. G.). **On the Blood Parasites found in Animals in the Zoological Gardens during the Four Years 1908–11.**—*Proc. Zool. Soc. Lond.* 1912. June. Part 2. pp. 406–419. With 7 plates.

The earlier part of the author's paper deals with the parasitic worms (microfilariae) found in the blood of the different animals examined by him. These were found in fifteen mammals of thirteen different species, in 101 birds of 74 different species, and in thirteen reptiles of five different species. Filariae, he states, have not been found before in 88 out of these 92 species of animals, and are new, at any rate as regards hosts. The animals came from all parts of the world, the largest number from the Americas, but other parts of the world also were well represented.

[These statistics show that infections with different species of filariae are very common in the lower animals.]

G. C. L.

RAILLIET (A.), HENRY (A.) and LANGERON (M.). **Le Genre *Acanthocheilonema* Cobbold, et les Filaires péritonéales des Carnivores.**—*Bull. Soc. Path. Exot.* 1912. June. Vol. 5. No. 6. pp. 392–395.

The authors, writing on the Nematode genus *Acanthocheilonema,* proposed by COBBOLD in 1870 for a filaria-like worm living in the peritoneal cavity of the aard wolf (*Proteles cristatus*), incorporate in this group the *Filaria perstans* (Manson) of man and the *Filaria recondita* (Grassi) of the dog. They note also that COBBOLD appears to have confused the anterior end of the body with the posterior, the characteristic hook-like lips which he regarded as distinctive for the genus being actually the cuticular expansions at the posterior extremity, which are familiarly known in medical literature as the Bishop's mitre. This inversion accounts for his failure to detect a vagina and for his erroneous conclusion that the genus *Acanthocheilonema* is a close ally of *Dracunculus.* From a note published two years ago in the *Proceedings of the Zoological Society,* London, it would appear that these data had already been established by LEIPER from an examination of COBBOLD's original material preserved in the Hunterian Museum, and the present paper therefore, re-affirms the view there expressed that the *Filaria perstans* of man must now be placed in a separate genus, *Acanthocheilonema.*

G. C. L.

FÜLLEBORN (F.). **Zur Morphologie der *Dirofilaria immitis* Leydi** [Leidy] **1856.**—*Centralbl. f. Bakt.* 1. Abt. Orig. 1912. July 17. Vol. 65. Nos. 4–5. pp. 341–349.

The author discusses the morphology of the common dog filaria, *Filaria immitis,* now classified in a new genus as *Dirofilaria immitis* by RAILLIET and HENRY. He describes material obtained from Texas and from Shanghai and finally comes to the conclusion that the parasites from these areas are of the same species and are identical with *Dirofilaria immitis.* Many careful measurements show this. The author touches on the difficulty of distinguishing *immitis* embryos from those of *F. repens* (*Dirofilaria repens* in the new terminology of Railliet and Henry) and states that this is practically impossible.

G. C. L.

BAUCHE (J.) et BERNARD (P. Noel). **Note sur Quelques Filarioses Animales de l'Annam Central.**—*Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 622–624.

In a previous note the authors described a series of filariae from animals in Annam. These were determined by RAILLIET and HENRY as follows:—*Dirofilaria repens* (subcutaneous filaria of the dog), *Setaria bernardi* (peritoneal filaria of the pig), *Eloeophora poeli* (B. Vryburg, 1887) and *Onchocerca armillata* (intravascular filariae of cattle), and *Filaria bauchei* (lung filaria of pig).

They now add some notes on filariasis in the same region. Besides the parasites mentioned above they have met with a microfilaria in the blood of a young pig, with the *Setaria labiato-papillosa* (Alessandrini, 1838) a filaria of the peritoneal cavity of cattle and buffaloes, with the *Setaria equina* (Abildg. 1789) a filaria of the peritoneal cavity of the horse, and with a filaria of the eye of fowls, *Oxyspirura mansoni*.

Human filariasis would seem to be rare, examinations of prisoners, patients in hospital and others having given negative results. Three cases of elephantiasis, however, were seen, a fact which indicates that *Filaria bancrofti* does exist in Annam.

G. C. L.

DRACONTIASIS.

CHITALE (P. K.). **Observations on 300 Cases of Guinea Worm.**—*Indian Med. Gaz.* 1912. Aug. Vol. 47. No. 8. pp. 318–320.

The guinea worm is regarded by Major Chitale as fairly common in the town of Damoh in the Central Provinces, India, and in the villages around within a radius of five miles. The specimens found range in length from thirteen to thirty-eight inches and vary from one-twelfth to one-tenth of an inch in thickness. The mouth has a triangular orifice, close to which on the dorsal and ventral surfaces are two raised papillae surrounded by smaller raised dots, about four to five in number. Infection is traced to the water of certain wells and tanks in which persons suffering from guinea worm wash their ulcers. The complications noted in neglected cases are (1) extensive abscesses, (2) fistulae and sloughing, (3) stiffening and ankylosis of joints. A fatal termination is rarely met with. The author finds that the application of poultices of young sprouts of the Baman tree mixed with gur and linseed meal night and day, as recommended in old Sanskrit medical works, certainly softens the tissues and greatly facilitates the removal of the worm. The wells are treated with permanganate and sulphate of copper, 1:100,000. A daily use of minute doses of Liq. arsenicalis or of asafoetida is said to act as a preventive.

R. T. Leiper.

GRAHAM (W. M.). **A Report upon Experiments made at Lagos to Ascertain the Possibility of Killing Cyclops in the Public Wells by Heating the Well Water with Steam from a Portable Steam Boiler.**—Report to the Secretary of State for the Colonies.

A practical test of the method suggested by LEIPER,* of dealing with guinea-worm infected town-wells by means of steam, has been made in Lagos. The public wells in the Lagos township are all fed by sub-soil water and vary greatly in the amount of water they contain at different seasons. The water is brackish save at Ebuta Metta. For the purposes of the experiment it was necessary to find a well in which cyclops existed in sufficient numbers to permit of a rapid determination of their presence. One of the wells at Ebuta Metta was selected as fulfilling the requirements. The well was 24 feet deep and had a depth of water of four feet one inch. The temperature at the commencement of the experiment was 28° C. Steam was passed into the water through an iron pipe one and a quarter inches in diameter, under a pressure of about forty pounds to the square inch. At the end of one hour the temperature of the well water had reached 63° C. and living cyclops had disappeared. Laboratory experiments, made previously, had demonstrated that the various species of cyclops met with in Lagos water were killed in water raised to a temperature of 42·5° C. to 43° C. The Director of the Medical Research Institute reports that the method proved an easy and fairly rapid way of dealing with infected well water at the end of the dry season, when the water in the well was almost at the lowest level, and that it is evidently a practicable method of killing organisms such as cyclops in wells without rendering the water useless. A series of experiments was also undertaken to ascertain if the cyclops are capable of surviving in the mud during the dry season and restocking the wells temporarily sterilised by this method. The results so far have been negative for cyclops, but the closely allied Daphniae showed a capacity for revival from sun-baked mud. Dr. Graham concludes that further investigations may show that cyclops can likewise produce resting forms.

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* *Jl. London School of Trop. Med.* 1912. Vol. 1. Pt. 1. pp. 28–30.

[It remains to be shown that, even if such resting stages occur in mud at the bottom of wells which contain water, they are capable of surviving a temperature fatal to free swimming stages.]

R. T. L.

Lane (Clayton). **The Prevention of Guinea-Worm Disease.** [Correspondence.]—*Indian Med. Gaz.* 1912. July. Vol. 47. No. 7. p. 294.

Major Clayton Lane writes to the editor of the *Indian Medical Gazette* in the interests of Indian hygiene regarding the criticisms made in a recent issue of the *Gazette* upon the suggestion of Leiper (*v. supra*) for the eradication of guinea-worm from infected town wells. It will probably be generally admitted, he suggests, that it is at least premature to condemn the proposal as impracticable, and as the method has every appearance of proving cheap and feasible he hopes that its efficacy may be given a practical test under the conditions proposed.

R. T. L.

ALCOCK (A.). **Miscellaneous Notes from the Entomological Department. 3. A Suggestion for Destroying Cyclops in Small Collections of Water.**—*Jl. London School of Trop. Med.* 1912. July. Vol. 1. Pt. 3. p. 206.

Cyclops have been found to be very sensitive to caustic potash: a solution of 0·15 per cent. kills them instantaneously, while 0·07 per cent. is fatal in two to ten minutes. In the weaker solution an occasional female may still show signs of life after ten minutes. The weaker solution works out at one pound of KOH to about 180 gallons of water. The author regards the method as cheap, efficient, and probably harmless, and thinks it applicable in villages where guinea-worm exists and the wells are known to be infected with cyclops.

R. T. L.

HELMINTHIASIS.

ANKYLOSTOMIASIS.

BOZZOLO (Camillo). **Notes on the Treatment of Ankylostoma Anaemia (Uncinariasis, Hookworm disease) with Thymol.** *Jl. Amer. Med. Assoc.* 1912. June 8. Vol. 58. No. 23. pp. 1744–1746.

Bozzolo, the originator in 1879 of the thymol treatment of ankylostomiasis anaemia, as a result of his accumulated experience regards as exaggerated the fears of those who consider the after effects of the drug as likely to be poisonous, and see a danger in the giving of large doses or the contemporaneous administration of alcohol. In some cases he has administered in capsules no less than 12-15 gms. in twelve hours with no observable ill effects. Only one case has ever proved fatal in his hands: that of a woman with marked enteritis. Before applying the drug to the treatment of ankylostomiasis anaemia Bozzolo had used it with success in glycosuria with no serious after effects. An explanation of the apparent contradiction between the small number of worms recovered from the faeces and the improvement of the patient under treatment is most probably to be found in the gradual poisoning of the parasites and their digestion during the slow passage through the bowel, which gives ground for administering smaller doses in weak persons and where proper supervision cannot be maintained. In cases of persistent enteric catarrh it is also advisable to precede the anthelmintic treatment by a dry diet and administration of preparations of tannin. With regard to the solvent action of alcohol on thymol and the possibility of severe poisoning it is of interest to note that Bozzolo used to give 12 gms. in capsules of 6 gms. each at two hours' interval, and that a small glassful of strong wine or some alcoholic mixture was administered after each dose to facilitate the solution of part of the drug. In these cases no other phenomena than giddiness, tipsiness, and sleepiness were observed although the urine was dark in colour and gave a phenol reaction with ferric chloride.

R. T. Leiper.

COCKIN (R. P.). **A Further Report on Work done in connection with Ankylostomiasis at the Colony Hospital, St. George's, Grenada [Windward Islands].**—Report to the Secretary of State for the Colonies, July, 1912.

In continuation of a previous report on the extreme prevalence of ankylostomiasis in the Colony of Grenada, R. P. Cockin gives the results of an examination of a further series of over a thousand cases and again urges the necessity for a vigorous campaign. During the investigation the following helminths were determined: *Ancylostoma duodenale, Ascaris lumbricoides, Oxyuris vermicularis, Trichocephalus trichiura, Strongyloides stercoralis, Taenia solium,* and doubtfully *Taenia confusa.* Of one thousand consecutive cases microscopically examined 64·2 per cent. showed eggs of *A. duodenale,* 70·5 cent. those of *A. lumbricoides,* and 73·8 per cent. of *T. trichiura.* The *Oxyuris vermicularis* was determined in 9·5 per cent. and *S. stercoralis* in 12·1 per cent. The author gives striking testimony to the close association existing between ankylostoma infection and disease of the heart and kidney. Whereas in 159 cases cardiac and renal disease occurred in conjunction with ankylostomasis, in only 13 cases in the series was the parasite absent. That is, the association occurred in 92·5 per cent.—a percentage out of all proportion to the degree of infection amongst the sick population generally. The chief form of cardiac affection in these cases was dilatation, following upon degenerative changes in the heart muscle. For a period of six months three distinct methods of treatment were practised at the Colony Hospital: thymol, eucalyptus and chloroform, and beta-naphthol. Dr. Cockin's experience points to the undoubted superiority of beta-naphthol, not only on account of its rapid and complete expulsion of the parasites, but also because of its cheapness and the freedom from danger in its administration. The only complication noted in its use was haemoglobinuria, which occurred in five of the cases.

R. T. L.

NICHOLLS (Lucius). **Windward Islands (St. Lucia) Laboratory Report for the Six Months ended March 31st, 1912: (3) Ankylostomiasis in Domesticated Animals.**—Report to the Secretary of State for the Colonies.

Dr. Nicholls regards ankylostomiasis as undoubtedly the most important disease of domesticated animals in the island of St. Lucia and as the cause of death of a large number of sheep, a poor and emaciated condition in numerous horses, and the loss of many dogs. The diagnosis was easily effected by microscopical examination of the faeces and treatment consisted in administering large doses of β naphthol or thymol followed by Epsom salts. The dosage recommended is: three doses of one and a half drachms each for ponies, three doses of one drachm for sheep and three doses of twelve grains each for dogs, to be given at intervals of an hour in the morning after fasting.

[These observations are of special interest in view of the widespread occurrence of ankylostomiasis amongst the inhabitants of the Windward Islands, but it should be noted that most probably the term ankylostomiasis is here used in a wide sense, to include all the parasitic nematodes in which the ova resemble those of the ankylostomes of man. There is no reason to suppose that the gross infection of these domesticated animals would be a source of danger to man although it undoubtedly, as Dr. Nicholls points out, is a source of much loss to breeders.]

R. T. L.

GLOVER (M. W.). **Hookworm among Oriental Immigrants.**—*Jl. Amer. Med. Assoc.* 1912. June 15. Vol. 58. No. 24. pp. 1837–1840.

Advantage has recently been taken of the provisions of the Immigration Act, regulating the admission of aliens into the United States, to make a routine examination of the stools of a considerable numbers of the aliens passing through the immigration station on Angel Island, California. Of 2,255 persons no less than 1,077 were found to harbour either the *Ancylostoma duodènale* or the *Necator americanus*. 63 per cent. of the Hindus examined were found to be infected, and their rejection led to an effectual check upon this class which was beginning to assume embarrassing proportions. It was remarked, however, that in marked contrast to the Chinese and Japanese, these Hindus, chiefly from the Punjab, were strikingly free from the other common intestinal parasites. A large number of statistics is given to show the age incidence of infection amongst males and females of Chinese, of Japanese, and of Hindu aliens, but great care must be made in drawing any deductions of a sweeping character therefrom, as it is apparent that the social antecedents of the various groups are recognised to be widely different. The author regards the possibility of the infection of the Pacific coast and South-Western states as a very grave one. This sparsely inhabited region is now rapidly becoming settled by orientals, who retain their careless personal habits and conservative adhesion to patriarchal modes of fertilisation of the soil with human excrement. Unless some definite attempt at communal action is made very soon, there seems little doubt that, in a short time, the problem now being faced in the south-east by the Rockefeller Commission will present itself in an aggravated form in these regions also.

R. T. L.

L'Anchilostomiasi tra gli Operai delle Solfare in Sicilia. [Ankylostomiasis amongst the Sulphur Miners in Sicily.]—*Policlinico.* Sez. pratica. 1912. June 9. Vol. 19. No. 24. pp. 876-881.

In 1898 a Government Commission had ascertained that the workers in the sulphur mines in Sicily were infected with ankylostomes to the extent of fifty per cent. More recently the percentage has been estimated at about seventy per cent. *Il Policlinico* devotes an editorial article to the discussion of the best organisation by which the various measures of prophylaxis can best be adapted to the peculiar conditions of the work and the character of the employees.

R. T. L.

DORSETT (Thomas W.). **Syphilis complicated with Uncinariasis.**—*Jl. Amer. Med. Assoc.* 1912. Aug. 10. Vol. 59. No. 6. pp. 445-446.

The effects of salvarsan appear to Dorsett to have been retarded or counteracted in a case of syphilis, exhibiting a very large chancre, which recently came under his notice. 0·6 gm. of salvarsan was injected intravenously with very little reaction. The symptoms, instead of improving, gradually became worse and the chancre grew larger and very foul. After ten days the patient was treated for ankylostomes and a large number of worms were removed. Thereupon the chancre and other symptoms rapidly disappeared and in another ten days recovery was complete.

R. T. L.

SCHÜFFNER (W.). **Der Wert einiger Vermifuga gegenüber dem Ankylostomum, mit Bemerkungen über die Wurmkrankheit in Niederländisch-Indien.** [The Comparative Value of Vermifuges in Ankylostome Infection.]—*Arch. f. Schiffs. u. Trop. Hyg.* 1912. Sept. Vol. 16. No. 17. pp. 569–588.

This paper embodies a valuable series of comparisons between the action of the various anthelmintics used in the treatment of ankylostomiasis.

From 21 cases treated with Extractum filicis maris (10-12 gram dose) seven ankylostomes and no *Ascaris lumbricoides* were obtained. Some days later a course of thymol produced no less than 1,253 ankylostomes and four ascaris.

Freshly prepared Areca catechu (30-40 grams dose) given to twenty cases resulted in the passage of six ankylostomes and seven *Ascaris lumbricoides*. The same cases under thymol gave a few days later 745 ankylostomes and 65 ascaris.

In 96 cases thymotal (thymol carbonate), in doses of 5 to 25 grams, was administered, producing 115 ankylostomes and three *Ascaris lumbricoides*. The same cases a few days afterwards were treated with thymol and provided 4,709 ankylostomes and 203 ascaris.

One hundred cases treated with eucalyptus-chloroform-castor oil mixture passed 1,219 ankylostomes and eleven *Ascaris lumbricoides* and afterwards as a result of thymol administration a further 2,010 ankylostomes and 91 ascaris.

One hundred cases treated first with thymol passed 2,975 ankylostomes and 116 *Ascaris lumbricoides*, and upon additional treatment with eucalyptus mixture, got rid of 469 ankylostomes and five ascaris. When thymol was used in the first instance it accounted for 86 per cent. of the total number of worms removed, whilst eucalyptus under similar circumstances only accounted for 38 per cent.

In 100 cases submitted to two separate treatments with thymol the worms removed were (a) 2,423 ankylostomes and 283 ascaris and (b) 500 ankylostomes and 83 ascaris, *i.e.*, a total of 2,923 ankylostomes and 367 ascaris. Those accounted for by the first course of treatment being 83 per cent., those by the second 17 per cent. of the total.

One hundred cases (averaging from 160 cases actually treated) treated first with thymol gave 1,601 ankylostomes and 271 *Ascaris lumbricoides*, and later with β naphthol a further lot of 270 ankylostomes and nine ascaris: *i.e.*, the thymol accounted for 86 per cent. and the naphthol for 14 per cent. of the total.

One hundred cases (averaging from results of 122 actually treated) treated firstly with β naphthol gave 1,928 ankylostomes and forty ascaris, and later to thymol yielded an additional lot of 1,059 ankylostomes and 137 ascaris, *i.e.*, the β naphthol removed 64 per cent. and the thymol 36 per cent. of the total.

Thus on the basis of single treatment with the anthelmintic thymol dislodged 83 per cent., β naphthol 64 per cent. and eucalyptus 38 per cent. of the ankylostomes. Schüffner states that thymol proved highly efficacious also in its action against oxyuris, trichocephalus, and all forms of taenia. In cases with acute and subacute dysentery the exhibition of thymol is strongly contra-indicated.

R. T. L.

SCHISTOSOMIASIS.

CONOR (A.) et BENAZET (L.). Formule Leucocytaire et "Image d'Arneth" dans la Bilharziose.—*Bull. Soc. Path. Exot.* 1912. June. Vol. 5. No. 6. pp. 396–400.

An examination of the blood in fifty cases of urinary bilharziasis in South Tunis shows a diminution in the neutrophile polymorphonuclear leucocytes, a well marked increase in the number of the eosinophiles, the occurrence of myelocytes with acidophile granules, and a lowering of the neutro-leucocytic quotient (*i.e.*, percentage of neutrophile polymorphonuclears divided by the total of the percentages of the other leucocytes). Lymphocytosis is absent. The eosinophiles range from four per cent. to 48 per cent. In thirteen cases the percentage was under ten: in twenty-five cases it lay between eleven to twenty per cent., whilst in ten cases it reached 21 to 30 per cent. These cells appear to increase but little in the early stages of infection, attaining a maximum at about the second year of the malady and decreasing thereafter.

The "image d'Arneth" is a formula in which the neutrophile polymorphonuclear leucocytes are grouped into five sets according to the number of fragments into which the nuclear mass is subdivided. According to ARNETH the leucocytes are broken up under the influence of an infection and set free their antibodies. If the polynuclear leucocytes are derived from myelocytes by segmentation of the nucleus, the forms first to be disintegrated are those presenting a large number of nuclei so that the multinuclear leucocytes are in smaller proportion than those with only one or two nuclei. The formula is said in this circumstance to deviate to the left.

In the nineteen cases of bilharziasis investigated for this phenomenon there was a distinct deviation *to the right,* there being a large increase in the number of forms with multiple nuclei. Eosinophile leucocytes with three and four nuclei occurred more frequently than in normal human blood.

R. T. L.

COURTOIS-SUFFIT, JACQUET (P.) et GÉRY (L.). Un Cas de Bilharziose Intestinale contractée à la Guadeloupe.—*Gazette d. hôpit.* 1912. May 14. Vol. 85. No. 56. pp. 833–837.

Since MANSON described a case of bilharziasis from Antigua in 1903 other observers have revealed the existence of this disease, especially in its intestinal manifestations, in other islands of the Antilles. Guadeloupe is now added to the list of endemic centres in the West Indies. A typical example of intestinal bilharziasis has recently come under the notice of the authors, who give a full account of the post-mortem lesions found in the various organs—the liver, spleen and lungs showing marked fibrosis. The disease progressed very rapidly and proved fatal within a year. Of especial note were the intensity of the cirrhotic phenomena and the associated ascites and splenomegaly. The manifestations of the disease in this case are regarded as being "septicaemic" in type. The convulsions which marked the termination of the malady are held to be a direct outcome of the infection.

R. T. L.

MILTON (Frank). **Speculations on the Life-History of** ***Schistosomum haematobium.***—*Jl. Trop. Med. & Hyg.* 1912. Aug. 1. Vol. 15. No. 15. pp. 225–227.

From his experience of the effects of the *S. haematobium* on man and for other reasons Milton is led to believe in the possibility of auto-reinfection in certain cases, and that, as a consequence, practically the whole life cycle may, in some instances, be completed in man without the intervention of an intermediate host. He further states that the idea has long been fixed in his mind that infection takes place through the skin in all cases where infection is from without. He regards the lack of success of the attempts made by LOOSS, LORTET, and others to induce direct infection by the miracidium to be due possibly to the unsuitability of the material with which the investigations were made, and considers not liver, but spleen or lymphatic gland to be the most likely nidus for the developing cercaria.

R. T. L.

MURSELL (H. Temple). **Perforating Appendicitis of Bilharzial Origin.**—*Lancet.* 1912. Sept. 21. p. 818.

Bilharzial infiltration of the appendix is not uncommon in African natives who collect in Johannesburg for work in the mines, but it would appear that no case has hitherto been recorded in which appendicitis of bilharzial origin has resulted in perforation and been operated upon. In the case here recorded there was an indefinite history of recurrent abdominal pain extending over a considerable period. When the patient was admitted to the Johannesburg Hospital the condition was diagnosed as an acute perforating appendicitis with widespread peritonitis and pus. The abdomen was opened over the region of the appendix. The pelvic cavity appeared to be full of pus, of which a large quantity was evacuated. A large moveable lump was found attached to the caecum by a short stalk of fairly healthy tissue. This proved to be the appendix. The proximal end merely showed catarrh, but on passing down towards the lump the muscular coats became enormously thickened and fibrotic with numerous bilharzia eggs. A large stercolith occupied the lumen and there was also a perforation into the general cavity of the peritoneum. The specimen is now in the Hunterian Museum in London.

R. T. L.

JOYEUX (Ch.). **Note sur quelques Cas de Bilharziose observés à Kouroussa (Guinée française).**—*Bull. Soc. Path. Exot.* 1912. July. Vol. 5. No. 7. pp. 504–505.

A number of recent communications tend to show that bilharzial infections occur more or less sporadically throughout the French possessions in West Africa. In Upper French Guinea cases have occurred at Timbuctoo, Bamako, Bakel, Ouahigouya, and Dakar. Five have now been seen by Joyeux at Kouroussa. The former records showed that the predominant clinical type was vesical infection, complicated in two instances by intestinal lesions. In Joyeux's cases attention was drawn to the malady by the nature of the stools. Out of a hundred patients suffering from dysenteric symptoms four presented the ova of *Bilharzia haematobia* in the faeces. The fifth case was of vesical origin uncomplicated by intestinal infection. In three cases the eggs showed terminal spines; in two, lateral spines. In one patient, according to the author, the discharges from the bladder and intestine alike contained lateral-spined eggs only. Unsuccessful attempts were made to establish the mode of infection by bathing a *Cercopithecus ruber* in urine containing miracidia.

R. T. L.

LOGAN (O. T.). **Schistomiasis (Japonicum) and "Urticarial Fever." A Disclaimer of the Priority of Suggesting that these Diseases were Identical.**—*China Med Jl.* 1912. July. Vol. 26. No. 4. pp. 240–241.

Dr. Logan writes to the editor of the *China Medical Journal* to emphasise the fact that the credit of first associating urticarial fever with infection by the Asiatic bilharzia worm belongs to Dr. HOUGHTON, who had been called in consultation to see a case of schistosomiasis under Dr. Logan's charge.

R. T. L.

CONOR (A.) et BENAZET (L.). **Enquête sur la Bilharziose en Tunisie. ii. Le Foyer du Nefzaoua.**—*Arch. Inst. Pasteur Tunis.* 1912. No. 3. pp. 118–130.

During the year ending June 1912 Conor and Benazet have determined the presence of bilharziasis in no less than 22 of the villages and oases of Nefzaoua, a region of Tunis situated on the eastern border of the Chott-el-Djerid. The total number of cases met with is 61, of which fifteen occurred in the village Glia; but as the main purpose of the enquiry was to localise endemic centres it seems fairly certain that the intensity of the infection will prove on more detailed investigation to be much greater. Of the cases observed 72·13 per cent. were between eleven and 25 years of age; in 72·5 per cent. the first symptoms manifested themselves between the ages of six and 25 years. The urine was coloured with blood in eighteen cases of under one year's duration, in eight cases of less than two years. The eosinophiles were uniformly increased and on an average formed 18·26 per cent. of the white cells. In thirteen out of the 61 cases the presence of eosinophile myelocytes, in from one per cent. to four per cent., was noticed. The *image d'Arneth,* in these Nefzaoua patients, was deviated to the right. Using an analogous formula for the eosinophiles it appears that the binuclear forms make 83·47 per cent., those with three nuclei 14·79 per cent., and those with four nuclei 1·74 per cent. of the total eosinophile count.

R. T. L.

LANGERON (Maurice). **Mission Parasitologique en Tunisie (Septembre–Octobre 1911).**—*Arch. de Parasit.* 1912. Aug. 20. Vol. 15. No. 3. pp. 442–473.

In an account of a visit to Tunis for the purpose of enlarging the teaching collections of the Institute of Colonial Medicine in Paris, M. Langeron refers to the occurrence of bilharziasis in the oasis of Gafsa. During his brief stay there he succeeded in adding six cases of urinary infection to those already described by NICOLLE in 1908 and CONOR in 1910. Reference is also made to the intense infection of the oasis of Tozeur with ankylostomiasis, but time did not admit of new investigations on the subject.

R. T. L.

NEVEU-LEMAIRE (M.) et ROTON (A.). **Trois Cas de Bilharziose Vésicale observés à Dakar.**—*Arch. de Parasit.* 1912. Aug. 20. Vol. 15. No. 3. pp. 474–477.

As vesical bilharziasis had not been recorded hitherto from Senegal, the authors publish a description of three cases seen in the hospital at Dakar. The geographical distribution of the disease in Africa is summarised. It is endemic in Egypt and the Nile Valley. It extends almost without a break along the whole of the East Coast of Africa, Red Sea, Zanzibar, Portuguese East Africa, Zambesi, Delagoa Bay, Natal, St. Lucia Bay, Port Natal, and as far as Port Elizabeth in Cape Colony. It also extends inland, being found in Cape Colony, the Orange River Colony, Zululand and the Transvaal, Nyasaland, the valley of the Zambesi, in Uganda, the Sudan, and Kordofan, near Lake Chad, along the upper reaches of the Niger, and at Timbuctoo. On the West Coast isolated cases have been noted at Angola, Mossamedes and Cabinda, in the Cameroons, and on the Gold Coast. Further north it occurs at Casamance and lastly, as now noted, in Senegal. Along the northern shore bilharziasis is not infrequent in Tripoli, Tunis, and Algeria. In Europe the disease is rare and appears to be confined to Cyprus and Greece. In Asia it has been noted in Arabia at Mecca.

R. T. L.

TAPEWORM.

LUNN (W. E. C.). **Case of Tapeworm.**—*Jl. R. Army Med. Corps.* 1912. July. Vol. 19. No. 1. p. 99.

This case of tapeworm in a healthy woman of excellent physique is recorded on account of the apparently enormous length and size to which the parasite seems to have developed. After a dose of extract of male fern, preceded and followed by castor oil, four portions of worm were passed and collected into a bucket of water. When laid out and measured the total length attained 79 feet four inches, whilst in places the segments had a breadth of one inch. No heads were recovered and, so far as the author could ascertain, all the portions belonged to the same strobila. A year previously a single portion twenty feet in length had been passed after treatment. The species was apparently not identified.

R. T. L.

ALLAN (W.). **Thymol for *Taenia saginata*.**—*Jl. Amer. Med. Assoc.* 1912. July 20. Vol. 59. No. 3. p. 197.

Thymol, given in the usual manner either with or without a preliminary course of saline purging, has proved very effectual in the author's experience during the past year. In three cases treated without previous starvation or purgation the tapeworms were evacuated and no recrudescence is manifest, although ample time has since elapsed to permit of the complete regeneration of the strobila had the treatment failed to remove the heads.

R. T. L.

GRONBERG (J.). **Der breite Bandwurm und die Magensaftsekretion.** [The Broad Tapeworm and the Secretion of Gastric Juice.]—*St. Petersburger Med. Zeitschrift.* 1912. June 28. Vol. 37. No. 12. pp. 184-186.

From a statistical study of a series of patients in Finland, where infection with the broad tapeworm, *Dibothriocephalus latus*, is exceedingly common, Gronberg concludes that this tapeworm has no special influence on the gastric juice secretion. A comparison of a parallel series of patients with and without the parasite shows a close correspondence in the percentage of cases with (*a*) lack of acidity, (*b*) hyperacidity, as well as in the degree of (*c*) free acid and (*d*) of total acidity. Moreover the amount of free hydrochloric acid and the total acidity remained practically unchanged in patients who had submitted to a 'cure' for tapeworm in the course of the investigation.

R. T. L.

HELMINTHIASIS AND EOSINOPHILIA.

COPPEDGE (L. J.). **A Severe Case of Hookworm Infection showing an Entire Absence of Eosinophilia.**—*Jl. Trop. Med. & Hyg.* 1912. June 1. Vol. 15. No. 11. pp. 166-168.

Details are given of a case in many respects typical of ankylostoma infection, especially as to history, personal habits, and lack of sanitary conveniences. An examination of the faeces revealed large numbers of eggs of *Necator americanus*. When careful differential counts were made an entire absence of eosinophiles was noted. ASHFORD and GUITERREZ state that in one hundred severe infections a high degree of eosinophilia was almost constant, and the prognosis is grave when there was a paucity of eosinophiles as all these cases ended fatally. After 200 parasites had been expelled by thymol and purgatives, an examination of the blood gave one eosinophile in several slides. The patient made a good recovery. The differential count before treatment was as follows:—

	Per cent.
Small mononuclears	11
Large mononuclears	1
Neutrophiles (Polymorphonuclears) ...	70
Eosinophiles	absent.
Transitionals	14
Neutrophilic myelocytes	3
Basophiles	1
Normoblasts (two observed)	—

R. T. L.

Low (George C.). **The Absence of Eosinophilia in Chronic Cases of Helminthiasis.**—*Jl. of State Med.* 1912. July. Vol. 20. No. 7. pp. 413–417.

From his notes of blood examinations of a large number of natives, made in Uganda in 1902, Low contributes an instructive series of differential counts bearing upon the significance of eosinophilia in helminthiasis. Children and young adults when infected with helminths showed a well-marked eosinophilia, whilst none was observable in adults even when heavily infected with a variety of species. He suggests the hypothesis that the eosinophiles, which are tissue cells, at first come into the blood in response to some stimulus set up by the infection, but gradually disappear as this stimulus weakens with the prolongation of the infection. The development of the immunity probably takes a considerable time, for eosinophilia may persist for some years in white people who have returned to England with some helminthic infection. The results of the blood examinations of adults are as follows:—

—	Red cells.	Haemoglobin.	White cells.	Polymorphonuclear.	Large mononuclear.	Lymphocytes.	Eosinophiles.	Transitionals.
		Per cent.		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
I.								
Female (case of sleeping sickness). Aet. 26. Aug. 19.	2,160,000	60	3,750	52	30	14	4	0
Just before death. Sept. 29.	3,100,000	64	26,800	72	15	13	0	0

P. M. Helminths recovered:—*Schistosomum haematobium, F. perstans, A. duodenale* (many), *A. lumbricoides* (many), *Trichocephalus trichiura* (many).

—	Red cells.	Haemoglobin.	White cells.	Polymorphonuclear.	Large mononuclear.	Lymphocytes	Eosinophiles.	Transitionals.
II. Male (case of sleeping sickness). Aet. 32. Aug. 15.	4,000,000	78	6,870	56	28	12	1	3
Some days before death. Aug. 20.	6,200,000	100	22,000	70	17	13	0	0

P. M. Helminths recovered:—Ankylostomes (many), *A. lumbricoides* (few), *F. perstans* (few).

III. Male (case of sleeping sickness). Aet. 45. Oct. 15.	2,800,000	76	21,800	72	10	16	2	0

P. M. Helminths recovered:—Bilharzia eggs in faeces, *F. perstans* (slight); other helminths not looked for.

IV. Male (case of sleeping sickness). Aet. 24. Sept. 11.	2,771,000	65	9,000	50	22	20	2	5
Sept. 29	2,960,000	65	16,800	74	6	16	2	2

P. M. Helminths recovered:—*Schistosomum haematobium, A. duodenale, A. lumbricoides, Trichocephalus trichiura, F. perstans* (few).

That in heavy infections the absence of a corresponding degree of eosinophilia is not due to the impending death of the patients is brought out by the above table. Other instances in persons in perfect health were observed by the author. It is obvious that an absence of eosinophilia cannot be held any longer to be a sufficient reason for regarding a person as free from worms.

R. T. L.

UNCLASSED.

TIRUMURTI (T. S.). **An Interesting Case of Multiple Hydatid-Echinococcal Infection of the Abdominal Viscera.**—*Indian Med. Gaz.* 1912. Aug. Vol. 47. No. 8. pp. 314–317.

The author gives a detailed account of the history and clinical picture of a case of multiple hydatid infection, in which post mortem examination revealed the presence of an enormous thick-walled mother cyst filled with daughter and grand-daughter cysts and large flakes of a pultaceous greenish material. This cyst was completely extraperitoneal and almost filled the abdomen. The stomach and intestines were displaced to the right side under the liver and were enclosed in a small bag of peritoneum. Small cysts were found in numbers in the mesentery, omentum, and liver. The lungs, stomach, intestines, and heart had escaped infection. In all about 500 cysts were collected. Most contained a clear transparent fluid, but in two cysts the fluid was reddish and in others of a light greenish tinge. The specific gravity of the fluid in the clear cysts was only 998. Its reaction appeared faintly alkaline to litmus, distinctly so to phenolphthalein. A dense precipitate of albumin and a similar indication of the presence of chlorides and reducing substances resulted from an application of the usual tests. It is remarked, however, that as the tests were made upon cysts kept in formalin for six hours after the death of the patient some of the reactions may have been unreliable.

R. T. L.

JACKSON (Thomas). **Cases of Hydatid Cyst.**—*Indian Med. Gaz.* 1912. Aug. Vol. 47. No. 8. pp. 313–314,

During the previous fifteen months the author had seen five cases of hydatids coming from centres so far apart as Karachi, Lucknow and Ahmedabad. Although the cases themselves do not illustrate any new features of importance, their occurrence indicates that the disease is widespread and possibly increasing in prevalence in India.

R. T. L.

HENRY (A.) et CIUCA (A.). **Essais d'Anaphylaxie à l'Aide de Produits Parasitaires.**—*Compt. Rend. Soc. Biol.* 1912. June 21. Vol. 72. No. 22. pp. 983–984.

While the authors were engaged upon investigations on the bladder worm (*Coenurus serialis*) in the domesticated rabbit, some attempts were made to ascertain whether the phenomena of anaphylaxis could be determined either with the substance or fluid of the parasite, or with the serum of the host. Guinea-pigs injected with the fluid of *Coenurus serialis* always became highly sensitised to this substance. An aqueous extract of the heads and of the membranous portions, on the other hand, gave only a slight degree of sensibility. When injected with fluid from *Cysticercus cellulosae* (of the sheep) or from *Echinococcus polymorphus* (the common hydatid) the animals were almost unaffected by the injection of fluid from *Coenurus serialis*. In guinea-pigs, injection of the serum of a rabbit infected with *Coenurus serialis* induced a non-fatal anaphylaxis.

R. T. L.

LESLIE (A. S.). **Intestinal Parasites in Lower Burma.** [Correspondence.]—*Indian Med. Gaz.* 1912. July. Vol. 47. No. 7. pp. 294–295.

During 1911 the faeces of 1,000 new admissions to the Insein Jail were consecutively examined microscopically, and as they were all adult males from the Delta of the Irrawaddy the results are published as an additional contribution to the recent articles in the *Indian Medical Gazette* on the subject of intestinal parasites. There were found with:

	Cases.
Ova of *Ascaris lumbricoides* alone	195
„ „ *Trichocephalus dispar* alone	95
„ „ *Ancylostoma duodenale* alone	40
„ „ „ and ascaris	18
„ „ „ ascaris and trichocephalus	5
„ „ „ and trichocephalus	3
„ „ Ascaris and trichocephalus	51
„ „ *Oxyuris vermicularis*	2
Segments of *Taenia solium*	1
Total	410

To ascertain more accurately the incidence of ankylostome eggs 200 of the original thousand cases were re-examined in more detail, when it was ascertained that these eggs occurred in thirteen per cent. of the cases. The presence of ankylostomes did not appear to affect the health of the patient to any serious extent as a rule. The haemoglobin content of the blood in 45 cases of infection with ankylostomes, determined by Tallquist's method, ranged as follows:—Five cases one hundred per cent.; fourteen cases ninety per cent.; twelve cases eighty per cent.; nine cases seventy per cent.; and five cases sixty per cent.

R. T. L.

SHRIKHANDE (S. C.). **Death from Round Worms in the Throat.** [Correspondence.]—*Indian Med. Gaz.* 1912. July. Vol. 47. No. 7. p. 296.

A child of four years of age, after a successful operation for harelip, grew very restless during the night, and, tossing his limbs and struggling for breath, died before the arrival of the Assistant Surgeon. As the patient had been fairly healthy and was without heart or lung trouble and had taken the anaesthetic well, the cause of death remained inexplicable until during preparations for burial a bundle of living round worms was detected in the throat. It would appear that death resulted from a spasm of the glottis due to the entrance of the worms into the larynx.

R. T. L.

MISCELLANEOUS.

RICHARDS (Owen) and DAY (Harold B.). Egyptian Splenomegaly and its Surgical Treatment.—*Trans. Soc. Trop. Med. and Hyg.* 1912. July. Vol. 5. No. 8. pp. 333–363.

The authors state that a form of splenomegaly associated with hepatic cirrhosis is common in all parts of Upper and Lower Egypt, the disease closely resembling in its various stages the disorders described elsewhere as splenic anaemia (of infants and adults), pseudo-leukaemia infantum, simple splenomegaly and Banti's disease. Day describes the clinical and pathological side of the malady, Richards the surgical.

The condition, according to FERGUSON, is found in an easily recognisable form in no less than ten per cent. of autopsies performed on natives dying in the Government hospital at Cairo. It may be met with at all ages up to 30, but in infants and children is apt to run a severe course, while at a later age the chronic form, progressing to ascites, is the type almost exclusively encountered. The poorer native classes of either sex are chiefly, if not exclusively, attacked, Day never having seen a marked case in an upper class adult nor in a resident European.

The symptoms are fairly constant. There is irregular fever, wasting, and striking pallor; the spleen begins to enlarge and becomes hard and firm while the liver, though retaining its normal consistency, also increases in size. Sudden rises of temperature to 101° to 102° for one to three days are seen in about a third of the patients. The spleen and liver both go on enlarging steadily and produce a characteristic expansion of the lower part of the thorax and upper part of the abdomen, which is specially noticeable and easily recognised. The apex beat of the heart is often seen in the fourth space. The liver now is hard and firmer than normal. Apparently in mild cases the disease may come to a natural termination, leaving but slight traces of its passage, but more commonly it runs into a subacute or chronic condition with the final development of ascites. The patient then is much emaciated, the liver contracted and nodular, and the spleen, which at one stage may have been very big, is now of more ordinary dimensions.

The blood changes resemble those seen in other forms of splenic anaemia. In chronic cases there is anaemia and a marked leucopenia. In some of Day's cases, however, the large mononuclear leucocytes in the differential counts were very markedly increased.

Complications and concomitant disorders are frequent.

The duration of the disease varies but the course is always protracted, especially in older children and adults. Ascites is always an unfavourable symptom and, if the fluid rapidly re-accumulates after tapping, a fatal termination may be expected within six months of the onset. When there is not marked wasting the ascites has been seen to disappear, at any rate for a time.

As regards the morbid anatomy, Ferguson states that the spleen is firm in consistence and of a dark brown red colour, and exudes very little blood on pressure. The vessels are relatively small and the Malpighian bodies almost indistinguishable. Microscopically a general hyperplasia is seen and active phagocytosis on the part of the macrophages towards the red-blood corpuscles and leucocytes. This, Ferguson thinks, may explain the peculiar character of the anaemia. In the early stages the liver cells are granular and swollen, and isolated necrotic foci surrounded by collections of small mononuclear cells are met with, resembling those seen in typhoid. Later the organ presents the picture of a multilobular cirrhosis and in most patients dying with ascites is reduced in size. The bone marrow is altered, that of the shaft of the femur being a red colour. No constant changes are met with in the other abdominal or in the thoracic viscera. So far no cause for the disease has been demonstrated and Day has not obtained any satisfactory evidence of the responsibility of some organism of the Leishmania type.

Medical treatment is of little avail, no drug seeming to influence the onward march of the symptoms. Salvarsan given in three cases failed.

The second part of the paper deals with the operative procedures for removal of the spleen. Richards for surgical purposes divides the disease into two groups: (a) the cases in which the cirrhosis of the liver and ascites are the chief features and (b) those in which enormous enlargement of the spleen is the most prominent symptom. As regards (a), nothing can be done to relieve the cirrhosis, but as regards (b) there seems a reasonable chance that removal of the spleen will get rid of the main source of the disease. Thirteen cases were operated upon with the following results:—Four died within five months; in two the spleen could not be removed; three have only recently been operated on; and four appear to be cured (five to eight months' observation).

As regards the fatal cases Richards is forced to the conclusion that they were not fit for operation. The risk appears to increase as the cirrhosis of the liver becomes more advanced, but in cases on the border line so much improvement follows careful treatment and rest in hospital that an unsuitable case may sometimes be converted into a suitable one by these means. As regards the difficulty of the operation itself, this chiefly depends on the presence or absence of adhesions, which vary very much in extent and the existence of which cannot be foreseen.

A detailed account of the operation is given. The conclusions reached by the two authors are as follows.—

1. " A chronic disease, marked by progressive enlargement of the spleen and cirrhosis of the liver, is common in Egypt. Its cause is as yet unknown, but its clinical course is quite characteristic.

2. " Medical treatment improves the condition of the patients, but does not arrest the progress of the disease.

3. " Cases in which the cirrhosis of the liver has advanced to the stage of ascites and jaundice are not fit subjects for radical surgical treatment.

4. " Cases with moderate cirrhosis of the liver and great enlargement of the spleen can be restored to health by excision of the spleen."

G. C. L.

GABBI (Umberto). **Spleno-epatomegalia Cronica Febbrile (da Virus Ultramicroscopico?) con Varietà Poliadenitica.** [Chronic Febrile Spleno-hepatomegaly with a Polyadenitic Variety (? Ultramicroscopic Virus)]—*Malaria e Malat. d. Paesi Caldi.* 1912. July-Aug. Vol. 3. No. 7-8. pp. 199-229.

In this paper the author describes what he considers to be a new disease of adults of all ages in Italy. In many respects there is a close resemblance to the symptomatology of kala azar, for there occur the profound anaemia with consequent haemorrhages and oedemas, the irregular fever, the large spleen and liver, and intestinal disturbances. The disease is quite unaffected by any form of quinine treatment. The most careful examination by all methods of the peripheral blood and of material obtained by spleen puncture has failed to reveal any parasites, either bacterial or protozoal; tubercle and syphilis have been excluded. The author is convinced that the disease is neither malaria nor kala azar. He is quite aware of the caution that is necessary in making such a statement, but he has come to this conclusion after several years of observation. Experiments in which spleen puncture material was injected into monkeys yielded uncertain results; one monkey developed febrile symptoms and died. The parasite he believes to be ultramicroscopic. It is pointed out that other observers have noticed a similar disease in other countries. For instance, WOOLLEY (1906) described cases of tropical febrile splenomegaly in the Philippine Islands. FAICHNIE and BOND have described a similar disease, and BALFOUR has recorded two cases from the Blue Nile.

C. M. W.

BALFOUR (Andrew). **A Blood Puzzle Solved. The So-called X Bodies.**—*Lancet.* 1912. July 6. pp. 24-25.

Balfour draws attention to an interesting and useful paper by CHAMBERLAIN and VEDDER,[*] in which these observers show that the so-called X bodies, which have been found in smears of human and other blood, are in reality of the nature of artefacts in the glass slides on which the blood films are made, and that such artefacts are probably more common in old slides kept for long periods of time in the tropics. After reading CHAMBERLAIN and VEDDER's paper, Balfour succeeded in finding a slide showing a fair number of the smaller variety of X bodies. He thereupon repeated the former authors' washing experiment and as a result confirms their opinion as to the true nature of the bodies. Balfour believes that the X bodies are quite unlike the usual fallacies associated with flaws in glass slides, with which most haematologists are familiar. Considerable credit, he thinks, should be given to CHAMBERLAIN and VEDDER for clearing up one of the many blood puzzles which have troubled tropical workers. This discovery is, as he says, a good example of the necessity for testing not only our reagents but our tools and of approaching all blood problems with an unbiased mind.

G. C. L.

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[*] *Philippine Jl. of Science.* 1911. Vol. 6. No. 5. p. 421.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. I.] 1912. [No. 3.

MALARIA.

INVESTIGATIONS IN INDIA AND MALAYA.

Paludism: being the Transactions of the Committee for the Study of Malaria in India. 1912. September. No. 5.

This number contains the following original papers:—

(i) PERRY (E. L.). Malaria in the Jeypore Hill Tract and adjoining Coast Land; Second *ad Interim* Report. pp. 32-40. (ii) FRY (A. B.). Note on Malaria in Chota-Nagpur. pp. 52-58. (iii) ADIE (Helen A.). Distinction of Sex in the Larval and Pupal Stages of Anophelines. p. 41. (iv) PERRY (E. L.). The Use of Bile in Insect Dissections. pp. 44-45. (v) DAVYS (Maud L.). A Note on the Anophelines found in Quetta. pp. 46-51. (vi) JAMES (S. P.) and STANTON (A. T.). Revision of the Names of Malayan Anophelines. pp. 59-63. (vii) GILL (C. A.). Note on the Seasonal Prevalence of Anophelines with Special Reference to the Potentialities of a Single Breeding Place. pp. 65-70. (viii) FRY (A. B.). Indigenous Fish and Mosquito Larvae. (ix) LALOR (N. P. O'Gorman). Note on a Parasitic Fly which infests Malaria Carrying Anopheles in Lower Burma. pp. 42-43. (x) STANTON (A. T.). A Ceratopogon Parasitic upon Anopheline Mosquitos. p. 64.—

(i) Perry gives a table showing the incidence of malaria among the children in three villages. In all, 500 anophelines belonging to species well known to carry malaria were examined without a trace of malarial infection being detected. For 31 successive days anophelines were taken in one cowshed in one of these villages. *Myzomyia culicifacies* was the prevailing species, and daily all females taken of that species were dissected and the condition of the eggs recorded. Previous to dissection the mosquitoes were separated into four grades, according to the condition of the wings. In grade (1) were placed specimens with the wing well marked, and with the wing fringe practically complete. In grade (2) were placed specimens with the wing fairly well marked, but with the wing fringe somewhat worn. In grade (3) were placed specimens with the wing decidedly shabby and the wing fringe very much worn. In grade (4) were placed specimens with the wing actually threadbare. *Culicifacies* to the number of 3,757 were thus classified and dissected. CHRISTOPHERS has made the very important observation that occasionally an anopheline omits to lay one or two eggs of a batch and such retained eggs are found among the succeeding batches. Amongst the 3,757 *culicifacies* this phenomenon was observed 21 times. Amongst 1,410 specimens of grade (1) it never occurred. Amongst 1,797 of grade (2) it occurred 12 times, amongst 471 of grade (3) 5 times, and amongst 79 of grade (4) 4 times. From these figures it is obvious that progressive deterioration of the wing is a very useful indication of the relative age of mosquitoes.

The author then moved to Dhooliambo and made a more systematic search for infected anophelines. All these anophelines were taken from native houses in which small children with enlarged spleens slept. The mosquitoes were divided into the four grades described above.

Species.	Grade 1.	Grade 2.	Grade 3.	Grade 4.
Listoni	139	70	17	1
Jeyporiensis	171	54	21	—
Culicifacies	27	5	7	1

Amongst this number 4 salivary glands were found containing sporozoits. They were all specimens of *listoni*, grade 3. The author suggests that it is reasonable to hope that improvement in the technique of salivary gland dissection and the method of grading mosquitoes will materially facilitate the search for sporozoits. Up to date 14 species of anophelines have been taken in the agency.

Two species of worms parasitic in anophelines have been sent to the Central Malaria Bureau. Only one anopheline was found harbouring the first species. The second species appeared to be a large filaria and on some days was present in 5 per cent. of the anophelines taken. It is often ¾ inch in length. Infection appears to take place in the larval stage of the mosquito.

(ii) Statistics show that the fever season in Chota-Nagpur is during the latter half of the rains, in the months of August and September.

A spleen census showed that villages fell into two classes, the non-endemic and the hyper-endemic. A table gives the result of the spleen census in the villages of the plains, those at the foot of the Ghats, and those on the plateaux. Children only were examined. The open rice plains of Manbhum and contiguous borders of Ranchi had a village spleen rate of 0 to 6 per cent. The Ranchi plateau gave fairly uniform results of about 7 per cent. The villages at the foot of the Ghats below the plateaux showed hyper-endemic figures of 80 to 100 per cent. spleen rate. Tables are given and maps showing position of the villages.

A list is given of the anophelines found, with notes as to their frequency.

(iii) If an anopheline larva is examined with a strong lens or a 'two-thirds,' a brownish oval tumidity can be made out in males on each side of the 6th abdominal segment. The brownish oval tumidity is the pear-shaped testis with its broad sac. Ovaries and spermatheca are on dissection quite clear in the female pupa.

(iv) A small drop of bile placed on a slide and spread out wets the whole surface of the glass, and water or saline solution placed on the wetted surface spreads out in a uniform film. This use of bile enables a dissector of mosquitoes or other small insects to overcome the difficulty of uneven spreading of fluid on a slide, which is due to the presence of grease.

(v) The Sanitary Officer of Quetta was somewhat at a loss to account for the cases of malaria occurring there. As the sanitary report for 1910 appeared to contain no account of anophelines known to carry malaria the author made a search and found the following: *Myzomyia culicifacies, Neocellia stephensi, Patagiamyia lindesayi, Pyretophorus nursei, Pyretophorus nigrifasciatus.* An account is given of the seasonal prevalence of the adults of each species, and the breeding places of the larvae are described.

The most favourable temperature for the development of the Quetta anopheline appears to be a water temperature of from 68° to 72° F. At this temperature the larval stage is eight days, the pupal stage 36 hours or even less in rare instances.

Throughout this year (1911) at any rate the rise in malaria in Quetta corresponded in the most correct manner with the rise in the numbers of *M. culicifacies* and *N. stephensi,* taken together.

The author also notes that *Stegomyia* are to be obtained close to Quetta.

(vi) James and Stanton give the results of a thorough examination of the mosquitoes left by Dr. LEICESTER at the Medical Research Institute, Kuala Lumpur. They also examined their own collections. They give a revised list of Malayan anophelines.

(vii) Gill has kept under observation throughout a considerable period a particular breeding place. The observations were made at Muree in the north of the Punjab at a height above sea level of about 7,000 feet. The breeding place was formed of a stone-lined drain 24 feet in length, 18 inches broad and about one foot deep.

The author sums up his observations as follows:—(1) Whilst *P. simlensis, P. lindesayi* and *A. barianensis* are essentially hill species, other species such as *N. willmori* and *M. turkhudi,* which ordinarily occur in the plains, are capable of penetrating under favourable conditions even up to a height of 7,000 feet. (2) The rate of diffusion of anopheles may be greater than might be anticipated from their powers of flight alone.

(viii) Lower Bengal abounds in collections of permanent water which are all potential breeding places for mosquitoes. Fry with the help of Prof. CHOWDHURY has made a study of the larva-eating species of fish. The following is the list of commonest species found in fresh waters of Bengal:—*Haplochilus panchax, Haplochilus melastigma, Ambassis nama, Ambassis ranga, Anabas* *scandens*, *Barbus ticto* and other species; *Trichogaster*, several species.

The author has records of several hundred tanks and borrow pits and, if it is assumed in all cases that the water is permanent, his experience is as follows:—(1) If free of weed, with clean cut sides, without grass or bush, and with no shelving mud flats, they are always free of larvae. (2) If weed is excessive and thickly matted, both culex and anopheline larvae are numerous. (3) If there is but little weed and the edges are shelving, anopheline larvae only are found. The anopheline being a surface rester can wriggle into shallows where the culex cannot exist. This, the author believes, accounts for the undoubted comparative scarcity of culex in rural areas of Bengal. In other words, without adequate protection from fish mosquito larvae cannot exist.

The author from these observations indicates some practical points. The chief are that tanks and wells should be kept deep and never allowed to dry up, so that the fish may be preserved, and that those responsible should keep them free of weeds. The edges of wells and tanks etc. should be kept steep.

(ix) At Kyaukpyu, Lower Burma, a small fly of the family *Chironomidae*, genus *Ceratopogon*, has been found to infest anopheles of the following local species:—*Nyssorhynchus fuliginosus*, *Nyssorhynchus karwari*, *Nyssomyzomyia ludlowi*. It is usually found adhering to the abdomen of the specimens caught in houses. This fly sucks the blood from the stomach through the abdominal wall. Species of Ceratopogon are numerous at Kyaukpyu and bite human beings. It does not appear that much work has so far been attempted in India or Burma with regard to the classification of *Chironomidae*.

(x) Stanton examined for a year the anopheline mosquitoes taken in Pudoh Gaol (Kuala Lumpur, Federated Malay States). On six occasions he found a species of Ceratopogon with its proboscis deeply imbedded in the abdomen of female anophelines which had previously fed on blood; the anophelines were of the species, *N. fuliginosus*, *N. karwari* and *M. sinensis*.

These findings raise the interesting question as to the part these might take in the transmission of mosquito-borne diseases.

J. G. Thomson.

DIAGNOSIS.

SINTON (J. A.). **Urriola's Test for Malarial Infection.**—*Ann. Trop. Med. and Parasit.* 1912. Oct. 18. Vol. 6. No. 3. B. pp. 375-377.

URRIOLA stated that if the urine in malarial cases is centrifuged and the deposit examined under a high magnification four types of pigment granules may be found: (1) very fine granules massed together; (2) larger granules arranged in groups; (3) large masses varying in form; (4) granules included within leucocytes and hyaline casts.

Sinton examined the urine of ten cases of malaria. He came to the conclusion that on account of the small number of observations it was impossible to make any definite statement as to the value of URRIOLA's test, but it appeared that:—

> "(1) It is almost impossible to exclude the possibilty of the pigment derived from extraneous sources finding its way into the urine, and therefore the presence of small quantities of fairly large masses of pigment appears to me to be of no diagnostic value. (2) The trouble necessary to exclude the possibility of extraneous pigment appears to be too great in comparison with the value of the test. (3) As far as can be concluded from the few cases examined, the presence of pigmented leucocytes or casts appears to be of more value than free pigment in making a diagnosis of present or past malaria, especially in chronic cases. (4) The presence of pigmented leucocytes or casts does not seem to be an indication of active malaria, but rather of the fact that the patient has at some time or other had malaria. Two of the above cases were examined just before being discharged as cured, and one of the above cases had had no signs of malaria for two years, yet they all showed pigmented leucocytes. The presence of such pigment in the urine probably represents an attempt by the body, both during an infection and after the infection has passed off, to get rid of the pigment deposited in the tissues."

J. G. T.

PROPHYLAXIS.

HERRICK (H.). **Prevention of Malaria at Hyderabad, Sind.**—*Jl. R. Army Med. Corps.* 1912. Nov. Vol. 19. No. 5. pp. 551-565. With 1 map and 3 photographs.

The annual rise of the Indus fills the irrigation canals; most of the ground is under water and everywhere suitable breeding places for mosquitoes are found. (A map is given showing the position of the irrigation canals, and tanks always filled with water.) When the author suggested cutting off the water supply there was an outcry that cultivation would be ruined. The difficulty was overcome by repairing a sluice and making the cantonment superintendent responsible for the supply of water to the cultivators, so that only a sufficient amount of water should be let in and no more. Water was thus never left standing more than twenty-four hours in the irrigation channels. The tanks were drained.

The destruction of the mosquito breeding places being completed, a campaign was conducted against adult mosquitoes in houses. Two pounds of sulphur were burnt for each 1,000 cubic feet of space.

Quinine was administered as a prophylactic in doses of 15 grains on two consecutive days to all European troops. It was given in solution with dilute nitrohydrochloric acid. The author says that quinine, given as a prophylactic, must be commenced some months before an epidemic is expected. Care must be taken that no man escapes his dose. To malarial patients in hospital 10 grains of quinine were given two hours before an anticipated attack of benign tertian, and after the temperature was normal 5 grain doses were administered three times a day, for 10 days. Malignant tertian patients received 10 grains of quinine two or three times a day. All malarial patients received an after treatment extending over a period of four months. Nets are provided in hospital for patients; the ward door is screened and all windows covered with wire gauze.

In the author's experience the greatest incidence of mosquitoes was from September to November, though other officers have noted March and April. The anophelines found were:—*Myzomyia culicifacies*, *M. rossi*, *Ch.* [?*C.*] *pulcherrima*, *Pyretophorus jeyporiensis*.

A table is given showing the admissions of malarial patients to hospital during 1910 and 1911. The figures are small, but the decrease in malaria after the preventive measures carried out is sufficient to justify the value of the methods described by the author.

J. G. T.

WISE (K. S.) & MINNETT (E. P.). **Experiments with Crude Carbolic Acid as a Larvicide in British Guiana.**—*Ann. Trop. Med. and Parasit.* 1912. Oct. 18. Vol. 6. No. 3. B. pp. 327-330.

Paraffin, either in its pure or crude state, and even heavy petroleum oil, is useless as a larvicide in British Guiana, except in a few isolated cases. Most of the ponds, owing to the strong wind always blowing, must be treated with a soluble form of larvicide. Anything floating on the surface of the water, *e.g.* oil, is quickly blown to one side, before its asphyxiating properties come into play. The authors advocate that large areas of water should be kept well stocked with fish and free from floating vegetation. Small pits, foot prints of cattle etc., are treated with crude carbolic.

A series of laboratory experiments is given showing the action of different dilutions of crude carbolic acid, filtered carbolic acid, and pure medicinal carbolic acid. They show that crude carbolic acid is more toxic than the other forms. A dilution of 1 in 20,000 is sufficient to kill all larvae in two hours, but in the case of pupae a much longer time is required.

The authors recommend one teaspoonful of crude carbolic to every two cubic feet of water or one ounce to 16 cubic feet; this gives a dilution of about 1 in 16,000. An animal could drink 12½ gallons of this and take no harm. The water treated has a distinct tarry odour and animals do not drink it readily on that account.

J. G. T.

TREATMENT.

WERNER (H.). **Ueber Neosalvarsan bei Malaria.** [The Treatment of Malaria with Neosalvarsan].—*Deut. Med. Wochenschr.* 1912. Oct. 31. Vol. 38. No. 44. pp. 2068-2069.

Six cases of malaria, four benign and two malignant, were treated with neosalvarsan. Half the patients were given the drug intravenously, the others received an intramuscular injection. The conclusions are as follows:—(1) Neosalvarsan has the same specific action as salvarsan in benign tertian malaria. A dose of 1·5 gm. neosalvarsan corresponds to 1·0 gm. of the "old" salvarsan. (2) The effect is most marked after intravenous administration, but intramuscular medication is effective.` (3) The morphological changes in the benign tertian parasites after neosalvarsan are identical with those observed after salvarsan. (4) In aestivo-autumnal fever the action of neosalvarsan is insufficient; even 1·2 grammes given intravenously has no lasting effect.

J. G. T.

MORBID ANATOMY.

LAFORA (Gonzalo R.). **On the Changes of the Nervous System in Pernicious Malaria and the Neurological Sequelae resulting from Malarial Toxemia.**—*Jl. f. Psychol. und Neurol.* 1912. Aug. 19. No. 4-5. pp. 209-220. With 7 figures.

It is generally believed that toxins are the etiological factor in the production of the various nervous symptoms in malaria, for similar phenomena are produced in other toxic conditions, *e.g.*, influenza. Certain 'focal symptoms,' hemiplegias or other paralyses, undoubtedly depend upon multiple punctiform haemorrhages in the nerve centres, and subsequent fibrous degeneration.

An interesting pathological feature is that most of the neurological and mental forms do not show the parasite in the peripheral circulation, whereas the vessels of the brain when examined microscopically are found greatly dilated, and filled with large numbers of parasites.

The author gives a full account of three cases. The first was one of malarial coma; the second showed no special neurological or mental symptoms with the exception of stupor, unsteadiness of gait (probably due to weakness) and cerebral vomiting; the third showed a condition affecting the peripheral nerves, and neither stupor nor coma.

In the first two cases post-mortem examinations were made. A detailed pathological account of the nervous system is given. Most of the ganglion cells were much degenerated showing an intense chromatolysis and swelling (acute degeneration). The whole cell appeared filled with small granules instead of Nissl bodies (figure given). The nuclei and nucleoli appeared normal. The neurofibrils were generally degenerated (fibrolysis); only small argentophile granules remained. The neuroglia cells were increased in number, especially in the vicinity of the vessels. In the grey and white matter were numerous large astrocytes showing a cystic condition of their protoplasm. Rod-like cells were found rather abundantly, some of them attached to the protoplasmic processes of the ganglion cells.

The capillary vessels were apparently increased in number and their lumen contained a very large number of parasites. The blood elements differed greatly from normal; large mononuclears of macrophagic variety containing degenerated parasites were extremely abundant. Endothelial cells of the vessel walls were free in the blood current and these also contained parasite inclusions (figured). The same cells in the walls of the vessels were markedly degenerated. These changes in the vascular walls are the cause of the punctiform haemorrhages. The type of parasite found was the aestivo-autumnal. The pia mater was slightly thickened and contained abundant macrophages and lymphocytes.

The third case, that which showed polyneuritis, had marked wrist-drop. The cause of this condition was probably a post-malarial intoxication affecting especially the peripheral nerves. A very full bibliography is given.

J. G. T.

UNCLASSED.

GIBBON (T. H.). **A Case of Malaria contracted in England.**—*Jl. R. Army Med. Corps.* 1912. Oct. Vol. 19. No. 4. p. 467.

The patient, a young soldier, was admitted to the Military Hospital, Canterbury, on May 21st, 1912. He was born in the village of Lydd, in Romney Marsh, and had been enlisted only for two months. Neither the patient nor any of his family had ever been out of England. The attacks of shivering and the temperature indicated malaria and this diagnosis was borne out by the finding of benign tertian parasites. An interesting history was given which suggested that the patient had a previous attack the previous autumn; several people in the village had a similar illness about the same time. The patient himself called this illness "Marsh-fever."

J. G. T.

MÜHLENS. **Malariaforschung in Jerusalem.** [The Study of Malaria in Jerusalem.]—*Deut. Med. Wochenschr.* 1912. Oct. 24. Vol. 38. No. 43. pp. 2036-2037.

This memoir is a preliminary report of the results obtained by the German expedition to Jerusalem. The blood of 2,839 inhabitants of Jerusalem, Jaffa, and the German Colony of Sarona, was taken for purposes of examination. Of these specimens 2,114 have been examined and 444 shewed parasites. Of the 444 patients 180 were Arabs (Mohammedans), 105 Arabs (Christians), 137 Jews, 22 Europeans (Christians). Benign tertian parasites were found on 185 occasions, malignant tertian on 201, and quartan on 58.

The anopheline most commonly found was *A. bifurcatus.*

J. G. T.

CELLI (Angelo). **La Diminuzione della Malaria in Italia.** [The Diminution of Malaria in Italy.]—*Policlinico.* Sez. pratica. 1912. Oct. 20. Vol. 19. No. 43. pp. 1555-1565.

This paper was read at the International Congress, Washington. Tables are given which show the remarkable diminution in malaria since the introduction of State quinine. The mortality from malaria has fallen from 15,865 to 3,619 yearly. It is demonstrated clearly by statistics and tables that malaria has been reduced amongst the military, the working classes, and farming population.

The work of improving the water supply has not done much to eradicate mosquitoes, especially in the large marshy districts.

J. G. T.

OBST (S.). **Kurze Uebersicht über die Bekämpfung der Malaria in Italien.**—*Wien. Klin. Wochenschr.* 1912. Aug. 15. Vol. 25. No. 33. pp. 1257-1258.

A short review of the antimalarial campaign in Italy.

J. G. T.

SINTON (J. A.). **Some Attempts at the Cultivation of the Malarial Parasite by Bass's Method.**—*Ann. Trop. Med. and Parasit.* 1912. Oct. 18. Vol. 6. No. 3. B. pp. 371-373.

In none of the author's cultures was he able to satisfy himself that any increase, either in number or size, occurred in the parasites, although they persisted in some of the culture tubes for a very long time; attempts at subculture also failed. No marked difference was observed between the cultures kept aerobically and those kept anaerobically. At the time this paper was written, BASS had not yet published full details of his technique. (See this *Bulletin*, No. 1, p. 22.) [Sinton did not use glucose in his medium.]

J. G. T.

SCHNEE. **Über Mücken in Saipan.** [Mosquitoes found in Saipan.] —*Arch. f. Schiffs. u. Trop. Hyg.* 1912. Oct. Vol. 16. No. 20. p. 710.

The only *Culicidae* occurring in Saipan (one of the Marianne or Ladrone Islands, Pacific) were *Culex* and *Stegomyia*. Anophelines were entirely absent. Malaria never spread although infected persons were being imported from the Bismarck Archipelago. The author refers to the danger of yellow fever occurring after the opening of the Panama Canal.

J. G. T.

SMITH (F.). **Malarial Coma mistaken for Drunkenness.**—*Jl. R. Army Med. Corps.* 1912. Oct. Vol. 19. No. 4. pp. 463-465.

The author describes a case of malarial coma which was mistaken for drunkenness. The administration of quinine rapidly cured the patient.

J. G. T.

CARAZZI (D.). **Il Problema della Malaria.** [The Malaria Problem.]—*Gazz. d. Ospedali e. Clin.* 1912. Aug. 25. Vol. 33. No. 102. pp. 1057-1063.

The author believes that man may be only an incidental host of the malarial parasite and that it is therefore necessary to search in malarious districts for another animal host.

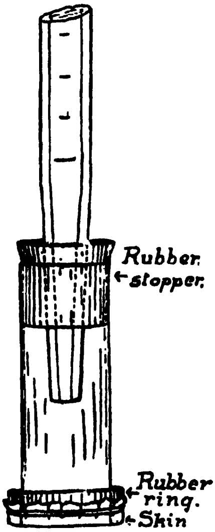
J. G. T.

SLEEPING SICKNESS.

TRANSMISSION.

RODHAIN (J.), PONS (C.), VANDENBRANDEN (J.), & BEQUAERT (J.). (i.) **Contribution au Mécanisme de la Transmission des Trypanosomes par les Glossines.**—*Arch. f. Schiffs. u. Trop. Hyg.* 1912. Nov. Vol. 16. No. 21. pp. 732-739. With 2 figures. (ii.) **Les Trypanoses Animales au Bas-Katanga et leur Rapport avec les Glossines (3e note*)**—*Trypanosoma Denysi* **(n. sp.) Parasite de l'Ecureuil Volant.**—*Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 608-611.

(i.) After an account of the conclusions reached by KLEINE, BRUCE and his collaborators, and ROUBAUD on the infective forms of trypanosomes in tsetse flies and of the experiments by the two last observers of the injection of salivary glands and proboscides into susceptible animals, the authors point out that these injection experiments failed in precision because, besides trypanosomes, the organs contained other forms of the parasites. In order to determine more exactly what forms are poured into the blood by the infective tsetse, the authors made flies known to be infective suck shed blood which they could examine immediately afterwards. It is admitted, they point out, that tsetse flies cannot feed except on blood in the vessels which is at a certain pressure. They therefore devised the following apparatus.—The lower end of an ordinary graduated one cc. pipette was fixed into a small glass cylinder, one cm. in diameter, by means of a rubber stopper and over the lower end of this cylinder a piece of fine skin, preferably that of a rat or mouse, was stretched and secured over a rubber ring, inner surface outwards. (See figure.) Citrated blood was put into the cylinder and rose in the pipette to a height which could be regulated. It is clear that the fluid in contact with the membrane was at a pressure determined by the height of the fluid, and that this could be measured as well as the amount taken up by the flies. With this apparatus they found that flies biting upwards through the membrane can feed at a pressure which is quite small; more than a hundred so fed. A table is given showing the result of an experiment in which ten flies sucked in turn through the membrane till the pipette was empty. Another experiment showed that flies could feed when the column of fluid above the skin was not more than 3·5 mm. in height. Afterwards they were fed as a



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* The second note of these authors was noticed in *Sleeping Sickness Bulletin.* Vol. 4. p. 213.

rule on the cylinder containing citrated blood to a height of 10 mm. The average amount of blood taken up by the flies was found to be 0·056 cc., maximum 0·091.

The authors next ascertained what forms and number of trypanosomes were poured into the fluid by an infective fly. In the course of experiments on the transmission of *T. brucei* (*pecaudi*) by *G. morsitans* an infective fly was isolated after it had infected four mice. The apparatus was filled with the citrated blood of a baboon under a pressure of 19 cm. [? mm.] and the fly was made to suck through the membrane. The blood contained in the cylinder was then centrifuged and the trypanosomes were counted with the Thoma-Zeiss apparatus. 1,562 were found and as some fluid was lost this was evidently a low estimate. After this count and the preparation of two slides the remainder of the fluid was inoculated into a mouse, which became infected. The parasites are figured and are described as 'salivary trypanosomes,' such as are found in the hypopharyngeal tube. Compared with *T. brucei* in the blood of mammals they are smaller and are distinguished by their narrow membrane and small undulations. Thirty specimens averaged 16·1μ in length and 1·5μ in breadth, the free part of the flagellum being 4·5μ. The length varied from 11 to 20μ. The infective fly was afterwards killed and found to have a generalised infection; that is to say, one of the intestine and proboscis, the hypopharynx being filled with small salivary trypanosomes. Trypanosomes of the intestinal type were not seen at all in the slides.

(ii.) This note deals with *Trypanosoma brucei* (or *pecaudi*) and its transmission by *G. morsitans* in nature and in the laboratory. This trypanosome was found in the blood of a dog and of a goat. *Glossina morsitans*, used for breeding purposes, were fed upon the goat and many became infected. A transmission experiment was made with 29 bred flies; after a latent period of eighteen days one became infected and produced infection in goats and other animals. On dissection it was found to have a total infection of the intestine and proboscis. The authors therefore have shown the existence of three types of trypanosomes pathogenic to stock in Lower Katanga, namely, *T. cazalboui* (*vivax*), *T. congolense* (*pecorum* of Bruce), and *T. brucei* (or *pecaudi*). These three species are here transmitted by *Glossina morsitans*.

In the second half of the paper the trypanosome of a flying squirrel is described. It is a large parasite 37 to 48μ in length and 2 to 4μ in breadth, with free flagellum measuring 8 to 10μ. The blepharoplast, 7μ in front of the pointed extremity, is large, measuring as much as 1μ. The trypanosome was constantly seen in the blood of the squirrel, which lived for three days.

[The method of feeding tsetse flies invented by these authors is very ingenious and can be easily practised. The pipette is unnecessary unless it is wished to measure the blood ingested. Experiments can now be devised which will give us precise knowledge of the infective forms of trypanosomes.]

A. G. B.

KINGHORN (Allan) & YORKE (Warrington). **Further Observations on the Influence of Meteorological Conditions on the Development of** *Trypanosoma rhodesiense*[1] **in** *Glossina morsitans*.—MS.

The authors refer to their previous paper on this subject (see this *Bulletin* No. 1, p. 43) and cite the conclusions. Further experiments indicate decisively that the development of *T. rhodesiense* in *G. morsitans* is directly dependent on the temperature to which the flies are subjected. 680 flies in all have been used in six attempts to transmit the human trypanosome on the Congo-Zambesi watershed at temperatures ranging from 59° to 65° without a single infective fly being obtained, whereas of 330 flies used in the Luangwa Valley six and probably ten became infective, the mean temperature ranging from 75° to 84°.

The incubator experiments described in the previous paper were repeated, laboratory-bred flies being now used. Attention is drawn to the fact that the low temperature on the plateau in the cold season was unfavourable to the pupation of *G. morsitans*. So slow was the process that the authors were unable to obtain sufficient flies; many which did emerge were malformed. They therefore placed the pupae, some of which had been deposited two months before, in the incubator at 85° F. and within three or four days a large number of flies were procured. A fresh experiment is detailed and this and the two previous ones are shown in a table. It is seen that of 189 flies used (133 wild and 56 bred) 2·6 per cent. became infective. As however 40 per cent. of the wild flies died in a week owing to the abrupt change of temperature, as contrasted with the ten per cent. of the bred flies, the figure is corrected to 3·3 per cent., which is close to that obtained in the valley experiments. An experiment done to determine if the relative humidity of the atmosphere was of importance seemed to show that it did not exert any appreciable influence on the developmental cycle.

An experiment to ascertain more definitely the influence of temperature is so interesting that it is given here—

> Two batches of wild *G. morsitans*, batch A 95 flies, batch B 119, shown to be non-infective by feeding upon clean monkeys, were fed for three days on a *rhodesiense*-infected guinea-pig. Each batch was then fed on a healthy monkey until the fortieth day, the mean temperature being 59°. Neither monkey became infected. The 42 flies remaining of batch A were placed in the incubator at 85° and the 58 flies of batch B were left at laboratory temperature. Of the batch A flies on the 43rd day only six were alive. From the 41st to the 47th day the flies of batch A were fed on a monkey (which died); from the 48th day on a rat. The rat became infected, showing that batch A contained an infective fly on the 48th day, eight days after being placed in the incubator. The four flies still alive on the 53rd day were fed on four clean rats, three of which became infected.
>
> On the 61st day the 38 flies of batch B, which had then failed to infect the monkey, were put in the incubator at 83°, and from that day till the 75th were fed on a healthy monkey. The animal unfortunately died. All the flies were dissected as they died. One was found to harbour trypanosomes in the salivary glands and gut, and animals inoculated with the contents became infected. In the first part of the experiment the relative humidity in the incubator was 36 per cent., in the second 72 per cent.

The experiment shows that the earlier stages of development can occur at a comparatively low temperature and trypanosomes can persist in this stage for sixty days, but for the completion of the cycle the temperature must be raised (75°-85°). These results are believed to give a satisfactory explanation of the failure of KLEINE to transmit *T. gambiense* by *G. morsitans* on the Victoria Nyanza, *viz.* that the temperature was not high enough. They are considered also to afford an adequate explanation of the extremely long latent periods of trypanosomes in Glossina, which have occasionally been observed.

[Drs. KINGHORN and YORKE may be held to have established their point, and the study of transmission data obtained with other trypanosomes by observers at different levels makes it probable that temperature has a direct influence on the cycle in the invertebrate in all cases. The practical bearing is evident.]

A. G. B.

Professor E. A. MINCHIN in his Report to the Committee of the Tropical Diseases Research Fund for the year ending June 30th, 1912, describes observations made in collaboration with Dr. J. D. THOMSON upon the transmission of the rat trypanosome by the rat flea. He alludes to the work of NÖLLER, who concluded that the flea transmits the rat trypanosome through its faeces, which are licked off by the rat. (See *Sleeping Sickness Bulletin* Vol. 4, p. 215.) Minchin writes that even if this is a possible mode of infection he and THOMSON are by no means convinced that it is the usual one. They have shown that the stumpy trypanosome, which is the end of the development, is formed in the rectum; if this is destined to pass out with the faeces, there is no reason why it should migrate forward to the stomach, as they have shown it to do. They note also that NÖLLER used the dog flea, not the rat flea. They have carried out experiments of feeding a known-infective flea on a healthy non-infected rat, the flea being watched through a hand lens; up to the date of writing these experiments had given no positive results. It has been previously shown that trypanosomes become non-infective 48 hours after being taken up by the flea. Experiments were done to determine the point of time at which the infectivity is lost. It was found to be a little over half an hour.

Development.—Of fleas fed on an infected rat only about one in five or six becomes infective; 80 to 84 per cent. are immune. If, however, the fleas are examined 24 hours after feeding, trypanosomes will be found in all. Many of these, therefore, are destined to degenerate. It is necessary to distinguish between the developmental series, which leads to the trypanosome establishing itself in the flea, and the degenerative series, destined to disappear. The process of degeneration is described. The degenerative forms are to be found chiefly in the rectum, and are especially abundant 18 or 24 hours after the flea has fed on the infective rat. They show a great tendency to attach themselves by the flagellum. They have the kinetonucleus posterior to the nucleus, while in the developmental forms the reverse is usually found; they show no signs of multiplication, whereas the developmental forms do. The developmental series may be divided into the stomach phase and the rectal phase. The chief feature of the stomach phase is that the trypanosomes penetrate into the epithelial cells and undergo multiplication by multiple fission. This intracellular multiplication may go on for about three days. The final product of the stomach phase is a long active form with the two nuclei more or less approximated. It is these forms which pass down into the rectum; the authors have seen them in the act. From them are produced the little pear-shaped forms which constitute the typical rectal phase. These are attached in vast numbers to the wall of the rectum; they multiply by binary fission, and become transformed into the stumpy trypanosomes.

Dr. WENYON (same Report) has confirmed NÖLLER's observation that the rat is infected by the dog flea with *Trypanosoma lewisi* not by the act of biting, but by the rat licking the faeces passed by the flea. He has, moreover, transmitted this trypanosome by the same method by means of the human flea (*Pulex irritans*). The infection is maintained even if the flea is fed on a human being, so that fresh human blood does not appear to be destructive to these forms in the flea.

A. G. B.

DIAGNOSIS.

DUBOIS (Albert). **Notes sur l'Autoagglutination des Hématies dans la Trypanosomiase Humaine.**—*Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 686-690.

The author has studied autoagglutination in African natives between slide and coverslip and by YORKE's method. When employing the usual method he classifies the phenomenon as '*forte*,' '*nette*,' and '*faible*,' according to its degree. He gives a series of tables. No. 1 is of non-treated sleeping sickness patients; of 38 all showed the phenomenon in the first or second degree. No. 2 shows the results with 24 treated patients; there was some degree of agglutination in all but one; it was never of the first degree, and in a few cases it was of the third. No. 3 shows the same for natives in good health; of 32, 22 showed the second degree of agglutination, three the third degree, and seven none at all. A fourth table gives the same data for twenty patients suffering from various diseases. In one case there was no autoagglutination; in the others the phenomenon was present, several times in the first degree. A fifth table gives the results with seventeen natives, infected and uninfected, citrated serum or plasma being mixed with an emulsion of red cells (after YORKE); the results were similar. The author has had no opportunity of studying the phenomenon in white patients. He has tried to make the blood of an animal autoagglutinate by injecting various chemicals into it, but without success. He concludes that the absence of autoagglutination is strongly presumptive of the absence of trypanosomiasis, but that its presence, in the Congo native at any rate, does not lead to any diagnostic conclusion. He suggests that the frequency of the phenomenon at Leopoldville may be due to the multiplicity of parasites and parasitic diseases to which the natives are subject—malaria, entozoa, filaria, syphilis and yaws.

A. G. B.

LANFRANCHI (A.). **Sur le Diagnostic des Trypanosomiases. Essais d'Identification des Différents Trypanosomes.**—*Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 611-614.

The author states that he has succeeded in immunising dogs against nagana. He has put the serum of such dogs in contact with the serum of rats, guinea-pigs and dogs infected with *Trypanosoma brucei* and *T. equiperdum* and has obtained an agglutination reaction, a precipitation reaction, and one of complement fixation. His conclusions are to this effect—

(1) The agglutination reaction obtained by the employment of serums of animals hyperimmunised against a given trypanosome does not enable one to identify the trypanosome. (2) The precipitation reaction under certain conditions allows a differential diagnosis between *T. brucei* and *T. equiperdum*. (3) The complement fixation reaction enables one to diagnose trypanosomiasis, but not to differentiate between these two species.

A. G. B.

TREATMENT.

BRODEN (A.), RODHAIN (J.), & CORIN (G.). **Le Salvarsan et la Trypanose Humaine.**—*Arch. f. Schiffs. u. Trop. Hyg.* 1912. Nov. Vol. 16. No. 22. pp. 749-779.

In this paper an account is given of the treatment of African sleeping sickness patients at Leopoldville, Belgian Congo, in 1910. The preparation and method of employment of the salvarsan solution are described, its action on the trypanosomes and on the human organism, the duration of its sterilising action, and its curative action. The salvarsan was the original form. It was used for the most part in intravenous injections given in sterile saline solution. This medium was found most convenient in Tropical Africa and intravenous injection was preferred to intramuscular because of the absence of pain. A preliminary trial showed that a dose below 0·01 gm. per kilo. caused the disappearance of trypanosomes in from fifteen minutes to less than an hour. The drug was very well tolerated. It seemed to act on the lymphatic glands less quickly than other organic arsenicals. It caused in the natives an increase of weight and an accession of strength.

To test the duration of the sterilising action eight persons received a single dose intravenously (0·4-0·6 gm.). The experiment was controlled here and throughout the work of the authors by the cytological and chemical condition of the cerebro-spinal fluid. Relapses were looked for by blood examination. The authors think that the thick film method is quite unreliable; they draw off 10 cc. of blood and centrifuge three times, repeating the process as a rule once a week. Relapses occurred after 27, 35, and 37 days; in three cases there was no relapse after three to three and a half months. The three patients who relapsed early had a large percentage of cells in the cerebro-spinal fluid. Similar results were obtained in the case of five patients who had intramuscular injections. From the two series of experiments it was concluded that salvarsan acts best in patients in the first stage, that is to say, in those whose cerebro-spinal fluid is not changed cytologically.

The drug was then used on patients (1) by itself, (2) with trypaflavin, (3) with trypaflavin and tryparosan. A table gives the data for 38 patients who were treated with salvarsan alone. It shows the state of the cerebro-spinal fluid before treatment; the doses and dates of the injections (either one or two); the date of relapse, if such occurred; the state of the cerebro-spinal fluid at a stated interval after treatment; and the result. Doses of one gram were given in many instances. In the consideration of the results the patients are divided into those with changed cerebro-spinal fluid and those with normal cerebro-spinal fluid; in the latter class are put all in whom the cells did not exceed ten per cmm. Of the fifteen patients in the first class only two improved. Of the 22 in the second class three who received small doses had a relapse, three disappeared, in two instances the results were doubtful, and thirteen were in a state of apparent cure at periods varying from three and a half months (two cases) to fourteen and a half months. The authors note that they use the expression 'apparent cure' if a certain time after the cessation of treatment the clinical state is good, there is no gland enlargement, no trypanosomes are found in the blood after centrifugation, and the cerebro-spinal fluid is normal.

Twenty-five patients were treated with salvarsan and trypaflavin. This dye is given in intravenous injections dissolved in saline solution. The doses were small as it appears to be irritating to the kidneys. The results are summed up as before. Of nine patients with changed cerebro-spinal fluid five had much improved (12 to 25 cells per cmm.). Of fifteen patients with normal cerebro-spinal fluid nine were apparently cured (four to twelve months' observation). A table is given.

Seventeen patients had tryparosan as well as trypaflavin and salvarsan. Reference is made to a previous communication on tryparosan (see *S. S. Bulletin*, Vol. 2, p. 171). Eight or nine gm. of this substance were given daily for three successive days. It is ingested in gelatine capsules. The natives were kept at the laboratory from six a.m. to midday and made to swallow a capsule once an hour. The procedure was to give an intravenous injection of trypaflavin on the first day; on the second, third, and fourth day tryparosan; and on the fifth and sixth day intravenous injections of salvarsan. Only two patients with an altered cerebro-spinal fluid were treated; they were not improved. In the other category there were thirteen. One died from an unknown cause four months after treatment; the other twelve were in a state of apparent cure after four months (seven cases) to ten months (three cases). It is noted that though the percentage of successes is apparently high the periods of observation were short. The treatment is described as *très énergique.*

The results of the three methods of treatment are summed up. It is concluded that when the nervous centres have undergone a marked change one cannot hope for cure after short and energetic treatment, but when they are slightly implicated, when the spinal fluid contains only a slight increase of cells, recovery may be hoped for. As regards the other category of patients all cannot be cured, but a considerable proportion may hope for recovery. The authors think that patients in whom apparent cure has been maintained for at least eight months are definitely cured. Putting the figures together one gets the result that in fifty patients treated at the first stage seventeen remained well for at least eight months, that is, a proportion of 34 per cent. To the objection that the results might have been improved by a longer continued treatment the authors reply that their object was to test the possibility of obtaining prompt cure in a certain class of patients.

Finally, they conclude that salvarsan given for sleeping sickness has a rapid and energetic action on *T. gambiense*; that on the patient himself its action is beneficial; and that, given by itself or with dyes, it produces in a good proportion of cases at the first stage *therapia sterilisans magna.*

[This valuable paper should be consulted in the original. There is an impression that salvarsan has no great value in human trypanosomiasis. From the published papers one gleans that it has not been tried systematically except in some advanced or previously treated cases. There can now be no question of its value, at least in the case of Congo natives.]

A. G. B.

TRYPANOSOMA RHODESIENSE.

STEPHENS (J. W. W.) & FANTHAM (H. B.). *Trypanosoma rhodesiense* **(Stephens and Fantham): a Second Species of African Trypanosome producing Sleeping Sickness in Man.**—*Brit. Med. Jl.* 1912. Nov. 2. pp. 1182-1183.

After an account of what led up to the description of this trypanosome as a new species the authors summarise the evidence in favour of its being new. The chief points on which they lay stress are the morphology; the animal reactions, for which they quote LAVERAN; the serum reactions (action of immune serum, of baboon and human serum, the trypanolytic reaction); and cross immunity experiments. As secondary characteristics they give the mode of transmission and the curve of measurements. In conclusion they express the belief that the disease has existed in Rhodesia and Nyasaland from time immemorial.

A. G. B.

MESNIL (F.). *Trypanosoma rhodesiense* **and** *Trypanosoma gambiense.—Brit. Med. Jl.* 1912. Nov. 2. pp. 1185-1186.

The author gives an account of the work done at the Pasteur Institute, Paris, on these two trypanosomes. He concludes—

> "1. That there is a marked differentiation between the two human trypanosomes of Africa, and that the creation of a new species for the trypanosome of Rhodesia is rendered legitimate.
>
> "2. But that these two species are more closely allied to each other than any other two known species of trypanosome."

A. G. B.

T. GAMBIENSE IN THE TISSUES.

WOLBACH (S. B.) & BINGER (C. A. L.). (i.) **A Contribution to the Parasitology of Trypanosomiasis.**—*Jl. Med. Research.* 1912. Sept. Vol. 27. No. 1. (New Series, Vol. 22. No. 1.) pp. 83-107. (ii.) **A Contribution to the Pathological Histology of Trypanosomiasis.**—*Brit. Med. Jl.* 1912. Nov. 2. p. 1188.

The authors have studied the distribution of trypanosomes in tissues and have tried to ascertain the factors concerned in the production of the lesions of trypanosomiasis. For this purpose they have modified Giemsa's method. This modification, which is too long to quote, gives, according to the authors, the same staining of trypanosomes as is obtained in film preparations. If fixation has been immediate and the sections cut are not thicker than 2 μ, the flagellum, undulating membrane, cytoplasm, nucleus, and blepharoplast are all clearly defined.

The material consisted of two strains of trypanosomes: one of *Trypanosoma brucei*, originally from Uganda, and one of *Trypanosoma gambiense* from the French Congo. The animals used were white rats, guinea-pigs, and monkeys. No external lesions, other than emaciation, were seen in any of the experimental animals except in one monkey and six guinea-pigs infected with *T. gambiense.* The monkey, which was inoculated on April 1st, developed oedema of the eye lids on May 2nd, and rapidly became moribund. In the six guinea-pigs with external lesions no trypanosomes were found in the blood. The lesions are described in detail. The authors believe that they are the first to record such extensive gross external lesions in guinea-pigs infected with *T. gambiense.*

The pathology and distribution of the trypanosomes in the heart, lung, spleen, liver, gastro-intestinal tract and kidney, etc. are given in detail. The brains of three monkeys and four guinea-pigs infected with *T. gambiense* were studied. In two cases microscopic lesions of the brain were found in monkeys; the blood of these animals when killed contained many trypanosomes.

The lesions in the first monkey were slight. In the other monkey they were more widely distributed, being found in sections from several different areas of the cerebrum, the base of the brain and in the pia covering the pons. The lesions consisted of infiltrations of the pia-arachnoid with endothelial and lymphoid cells, an increase of the subpial neuroglia, and a few perivascular infiltrations of endothelial and lymphoid cells. A rare plasma cell also occurred in the infiltrations.

Trypanosomes were found in considérable numbers in the infiltrated areas in the pia-arachnoid, in the subpial neuroglia tissue, in the perivascular infiltrations, in perivascular spaces not infiltrated, in the walls of small blood vessels and capillaries, and in foci scattered throughout the substance of the brain. In one instance a trypanosome was found in a ganglion cell. In the substance of the brain they were most numerous in the neighbourhood of blood vessels. The most marked lesions and greatest number of trypanosomes occurred in the region of the sulcus cruciatus.

As regards the morphology of the trypanosomes in the tissues, the authors state that by far the greatest number of those seen in sections and in contact film preparations are normal and dividing flagellate forms. These were found lying in tissue spaces, between cells and between collagen fibrils of connective tissue. Occasional flagellate forms in phagocytes were seen.

The summary of the paper in general terms is as follows:— The production of extensive skin lesions with giant cell formation in guinea-pigs infected with *T. gambiense* is of interest. The abundance of trypanosomes in the lesions of these animals and the scarcity in the blood is similar to YORKE's findings in the case of *T. rhodesiense* infected goats. The initial cell reaction is the proliferation of endothelial cells. The finding of numerous intravascular mitoses of endothelial cells in lung, liver, spleen, and kidney indicates the source of the increase of large mononuclear leucocytes in the blood in human trypanosomiasis. The sequence of pathological change is invasion of tissues by trypanosomes, oedema (not constant), endothelial cell infiltration, lymphoid and plasma cell infiltration, and fibrosis. The absence of granular leucocytes in all lesions is worthy of notice. Phagocytosis of trypanosomes takes place almost exclusively by endothelial cells.

In all animals infected with *T. brucei* and *T. gambiense*, lesions have been found in practically every organ, and trypanosomes have been found in these lesions. The most common seats of lesions are the connective tissue structures, and trypanosomes are found more abundantly in fibrous connective tissue than in any other place before the occurrence of the lesions. This preference for connective tissue heightens the numerous analogies between syphilis and trypanosomiasis. The failure of trypanosomes to invade the epidermis in the *T. gambiense* guinea-pigs is in marked contrast to the behaviour of the spirochaetes of syphilis, yaws and tropical ulcer. The character of the initial cell reactions, endothelial and lymphocyte, and the absence of polymorphonuclear and granular leucocytes, if comparisons with reactions to bacteria are valid, indicate a very low degree of toxicity of trypanosomes.

The paper is illustrated with six plates containing many excellent photomicrographs. Sections of spleen, liver, kidney, lung, and skin are shown. In many of these the trypanosomes are very distinctly seen, while figures from the cerebrum of a monkey infected with *Trypanosoma gambiense* show the position of the parasites in the tissues in a very convincing manner.

The final conclusions are given thus:—

> **" In trypanosomiasis the trypanosomes do not remain confined to the blood vessels and lymphatics. They invade the connective tissue structures of all organs, the reticular tissue of lymph nodes and spleen, and the substance of the brain.**
>
> **" The lesions of trypanosomiasis are due to the presence of the trypanosomes in the tissues.**
>
> **" The most common form of trypanosome in tissue, and we believe the one most active in the production of lesions, is the flagellate form."**

G. C. L.

SCHIZOTRYPANUM CRUZI IN EXPERIMENTAL ANIMALS.

da ROCHA-LIMA (H.). **Ueber das Verhalten des Erregers der brasilianischen Trypanosomiasis des Menschen in den Geweben.** [The Behaviour of *Schizotrypanum cruzi* in the Tissues.]—*Verhandlungen der Deutsch. Patholog. Gesellsch.* (15. Tagung). 1912. pp. 454-459.

In this paper, read before the German Pathological Society, the author gives an account of observations made by M. MAYER and himself on *Schizotrypanum cruzi* in the tissues. The strain was obtained in a guinea-pig and the tissues were studied principally in infected monkeys, and also in white mice. The chief seat of the parasites in the tissues was the striped muscles. They were found constantly in the fatty tissues, especially in fat cells with small fat droplets, and also in cells of the connective tissue, especially that beneath the epidermis. It is noted that VIANNA does not mention multiplication in the fatty tissue or connective tissue, so that one cannot say if this occurs in man; the examination of these tissues is very often neglected. Other sites not mentioned by VIANNA are lymphatic glands, bone marrow, spleen, and the unstriped muscle of the intestine and arteries. As regards the pathological anatomy there are three possibilities. The parasites may be in the cells without causing any lesion, or there may be lesions caused by the presence of the parasite, or lesions which have no direct connection with these. In the last case the appearances are attributed to the action of toxins. There follow details of the microscopical appearances of the various tissues. No parasites were found in the thyroid gland. Six photomicrographs illustrate the paper.

A. G. B.

DELANOË (M. & Mme. P.). **A propos du** *Schizotrypanum Cruzi.*—*Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 599-602.

This paper is described as a commentary on the 27 text-figures which illustrate it. Fourteen of these represent different phases of the cycle of development of *S. cruzi* in the muscles. There are seen to be leishmanial forms, leptomonas forms, crithidial forms, and trypanosome forms. The authors have not observed dimorphism in these developmental forms, as did MAYER and Da ROCHA LIMA. Dimorphism, they say, appears only at the trypanosome stage. They note, however, that in experimental animals the dimorphism tends to become less marked. They agree with BRUMPT that CHAGAS' males are young forms and his females the older ones.

Other figures show developmental forms met with in the blood of two mice, and numerous trypanosome forms not undergoing division. They believe that the forms in the blood are merely those of the muscles which have become free in the general circulation. In the blood of the same mice they noted the presence of developmental forms in large mononuclear leucocytes and macrophages; they did not think this an instance of phagocytosis. Other figures show forms met with in culture. Here blood trypanosomes soon became transformed into leishmanial forms, but trypanosomes may be met with in cultures four to five days' old. *S. cruzi* cannot be carried on by cultures. The authors did not succeed in infecting two adult mice with a culture 45 days' old. They note that CHAGAS obtained varying results in the inoculation of cultures, but does not mention their ages.

A. G. B.

BLANCHARD (Maurice). **Marche de l'Infection à** *Schizotrypanum Cruzi* **chez le Cobaye et la Souris.**—*Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 598-599.

Two guinea-pigs infected with *Schizotrypanum cruzi* were received from the Oswaldo Cruz Institute. Trypanosomes had disappeared from their blood on the 44th day after arrival. One was reinoculated in the peritoneum four times but never became infected; it was apparently immune. The other, having shown no trypanosomes between the 44th and 67th days, was killed and its blood introduced into two guinea-pigs; one of these became infected. Three other guinea-pigs infected from the same animal died on the 34th, 43rd, and 127th days. Seven passages were made in mice; the trypanosomes increased rapidly without crises, till death on the fifteenth or twentieth day.

A. G. B.

SLEEPING SICKNESS IN UGANDA.

In his Annual Medical Report for the year 1911 Dr. A. D. P. HODGES writes that sleeping sickness is decreasing everywhere except in the Nile Province, where it is stationary, and on Lakes Edward and George. A table is given of the deaths from sleeping sickness in the Protectorate during the years 1905 to 1911 (compare *Sleeping Sickness Bulletin,* Vol. 3, p. 430). The total for 1910 was 1,546, that for 1911 is 1,487. The deaths in Buganda and Unyoro respectively have decreased by about half; those in Busoga have risen from 698 to 1,013, an increase attributed by Hodges to increased accuracy in the native returns. The figures from the other parts of the Protectorate are incomplete. Of the 253 deaths in the kingdom of Buganda 151 were among the islanders and 102 among the inhabitants of the mainland.

Under the heading Sanitation an account is given of the preventive measures. It is noted that the porter traffic between Uganda on the one hand and the Lado Enclave and Belgian Congo on the other has been stopped in the former case and strictly limited in the latter. Other details given are of local interest. Reference is made to Mr. PASKE SMITH's report (see *S. S. Bulletin,* Vol. 4, p. 241). It is noted that the co-operation of the Belgian Government is essential for effective control in the region of Lake Edward.

Under the heading Hospitals it is stated that up to November 30th, 1911, 7,362 cases had been received into sleeping sickness camps; 280 cases remained under treatment at that date, all at Chagwe camp. The admissions during the year were 153. A table shows the condition of all the patients treated. Another table shows the condition of the survivors of the 489 cases admitted to Chagwe camp during 1907 (see *S. S. Bulletin*, Vol. 3, p. 309).

Condition.	A.	B.	C.	Died.	Absent.	Total.
November 30th, 1909	40	21	9	—	—	70
„ „ 1910	4	13	15	27	11	70
„ „ 1911	8	8	9	38	7	70

Of these cases, admitted in the early stage of the disease, 6·5 per cent. survive, of whom 1·6 per cent. remain in the 'A' class. In treatment, preparations of organic arsenic have had the best results.

Finally, an account is given of the investigations undertaken during 1911. The presence of new fly areas is noted and of small fresh foci of infection.

A. G. B.

UNCLASSED.

VIX (W.). **Psychiatrisch-neurologischer Beitrag zur Kenntnis der Schlafkrankheit nach Beobachtungen in den Schlafkrankenlagern Kigarama und Usumbura in Deutsch-Ost-Afrika und aus dem Laboratorium der Kgl. psychiatr. u. Nervenklinik zu Breslau (Geh. Rat Bonhöffer).** [Psychiatry and Neurology of Sleeping Sickness.]—*Arch. f. Psychiatrie u. Nervenkrankheiten.* 1912. Vol. 50. No. 1. pp. 1-30.

The observations recorded in this paper were made in the course of a stay at two sleeping sickness camps in German East Africa. Material was obtained also from post-mortem examinations for investigation at home. Seventy patients were studied, all at a more or less advanced stage of the disease; all had been treated by atoxyl. Trypanosomes were found in 65, either in the blood or cerebro-spinal fluid; it was doubtful whether two of the others had sleeping sickness at all. During the author's stay lumbar puncture was done on 27 cases; trypanosomes were found in 21. In all these the cells were increased in number. Psychical phenomena were observed in 55. Only five had sleep symptoms. The nervous and mental symptoms are described and analysed. A symptom seen sixteen times was exophthalmos, usually associated with acceleration of the pulse. This syndrome persisted in several cases in which recovery is believed to have taken place; there was never enlargement of the thyroid gland. An account is given of each case, headed by the most prominent psychical or physical symptom and, finally, an account of the microscopical findings in the nervous tissues of three cases in which a post-mortem examination was made.

[The occurrence of exophthalmos in nearly 23 per cent. of cases of advanced sleeping sickness is remarkable. This symptom has not been recorded, to the writer's knowledge, before.]

A. G. B.

Kleine (F. K.). The Identity and Mode of Transmission of Trypanosomes.—*Brit. Med. Jl.* 1912. Nov. 2. pp. 1183-1185.

R. Koch expressed the view that the pathogenic trypanosomes had not yet acquired the position of fixed species, but were in a period of mutability. In Kleine's opinion this period is passed. He knows of no case in which one has been able fundamentally to alter the whole character of a strain. Moreover, all attempts to alter the specificity of a trypanosome in the body of Glossina have proved fruitless. He instances experiments in which *G. palpalis* were fed for a long time on infected and clean sheep and goats, and afterwards, to test their infectivity, on monkeys and clean goats; the trypanosomes remained far more infective for monkeys than for goats. In many cases inoculation into animals is enough to establish the specificity, but it is necessary to proceed in a uniform way. The chief points, according to Kleine, are that the quantity of the blood introduced should be 5 to 20 cc.; as many animals as possible must be injected; the injection must be subcutaneous; and, to determine whether it is positive or not, thick drops must be used for the blood examinations. He does not think the thick film method is sufficiently appreciated. He believes that when, using a technique free from all objection, one fails to infect a species of animals by subcutaneous injection with trypanosome-containing blood that species is insusceptible. He quotes a paper by Dutton, Todd, and Kinghorn in which they appear not to hold this view. He notes that the motility of individuals of the same strain is not always the same. Slight motility does not, for instance, exclude a trypanosome from the *cazalboui* group. Sluggish movement may be due to the formation of antibodies.

In respect to other methods of identification there is the cross inoculation method, the disadvantages of which the author names, and serum reactions. The advantage of serum diagnosis is that one can use the serum of relatively immune animals. Serum diagnosis is valuable in the identification of human trypanosomes. As regards the development in the body of Glossina, Kleine is convinced that it is a sexual one; he regards the types of trypanosomes found as male and female. He does not believe that infection of the salivary glands is necessary for the flies to become infective; he suggests that the salivary glands may be infected secondarily from the proboscis. With regard to the cases of sleeping sickness in Nyasaland and on the Rovuma river and the belief that the disease could not spread in the absence of *G. palpalis*, he suggests that the epidemic was accidentally recognised just at the moment when it was about to migrate from West to East Africa.

A. G. B.

Duke (H. L.). A Camel Trypanosome, with some Remarks on the Biometric Method of Diagnosing Trypanosomes.—*Proc. Roy. Soc.* 1912. Oct. 31. Series B. Vol. 85. No. B 583. pp. 563-568.

The trypanosome was obtained from the blood of a camel from Boran. Its morphology and measurements are given. 443

G. palpalis were used in transmission experiments; there was no case of successful transmission and no flagellates were found in the flies. A table shows the results of animal inoculations. The diagnosis is discussed, and it is concluded that, though not a typical *T. evansi*, it is probably that species.

In the remainder of the paper the question of the biometric method of diagnosing trypanosomes is discussed from the point of view of a worker in the field. The biometric method is considered of undoubted value in discriminating between two such species as *T. vivax* and *T. uniforme*, where the difference in size is one of the most important points of distinction. In the case of other mammalian trypanosomes, including *T. brucei*, *T. gambiense*, *T. evansi*, and others, exhaustive measurements are considered of little use. Thus, the diagnosis of *T. brucei* and *T. evansi* in reality turns upon the minimum measurements of the two species.* The measurements obtained for the various species vary with the observer and with the stage of the cycle.

With reference to the STEPHENS-FANTHAM method of measurement and the criticisms of those writers on BRUCE's method, it is contended that the criticisms, though doubtless true as regards geometrical exactitude, are irrelevant as regards practical application. Other considerations which make the biometric method inconstant are mentioned, and it is suggested that the refinements introduced by the above workers are not essential, the chief requisite being that the measurements are made in a constant manner.

A. G. B.

BRAUN (Hugo) & TEICHMANN (Ernst). **Versuche zur Immunisierung gegen Trypanosomen.** [Experiments of Immunisation against Trypanosomes.]—1912. Jena: Gustav Fischer. 108 pp. [Price 3·50 M.]

This Memoir is divided into six sections. In the first the methods employed for vaccination in trypanosomiasis are discussed. They are classed in two groups according to whether living or dead trypanosomes were used. An account is given of the authors' process. The second section contains an account of their own experiments. Eight strains were employed: two of dourine, one of caderas, two of nagana, one of *T. congolense* and two of *T. gambiense*. The subject is discussed under the headings active and passive immunity. The third section deals with the question of specificity of trypanosomes; the next with serum fastness; the fifth with complement fixation. The following are some of the conclusions—

(1) Trypanosomes obtained pure and killed by drying form an antigen with which mice, rats, guinea-pigs, and rabbits can be surely protected against trypanosome infection. (2) Toxins are not demonstrable in dried nagana and dourine trypanosomes. (3) The quantity of vaccine needed to obtain immunity is considerable and varies for the different animal species. (4) Both the saline extract of the vaccine and the residuum contain antigen. (5) The duration of the immunity varies with the individual. (6) Immune serums can be obtained from rabbits by means of the vaccine. (7) Serum-fastness is an acquired, not a permanently heritable property.

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* See curves in *Reports of Sleeping Sickness Commission of Royal Society.* 1912. No. 12. p. 18.

(8) The antigenic property of serum-fast strains may be very small. (9) The trypanosomes of dourine, nagana, and mal de caderas possess with respect to immunity many properties in common. Whether this holds good also for *T. gambiense* and *T. congolense* is uncertain. (10) Serums from rabbits and cattle sick of nagana and from rabbits infected with mal de caderas contain antibodies against the same serum-fast strains as in the case of rabbits infected with dourine. The serum-fast modifications of these three species of trypanosomes are therefore identical. (11) By means of the complement fixation method no differences can be demonstrated between the trypanosomes of nagana, dourine, and mal de caderas, and between their serum-fast modifications. (12) Pure carbolised suspensions of trypanosomes can be used for diagnostic purposes.

Many tables are given in the course of the Memoir.

A. G. B.

BETTENCOURT (A.) & BORGES (I.). **Présence de Trypanosomes dans le Sang des Bovidés Portugais.**—*Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 603-604.

For the last two years the authors have tried to obtain evidence of the presence of trypanosomes in the blood of cattle killed at the Lisbon abattoir. They used the cultural method. Eighty animals were examined without result during the months January to April and November to December. The technique is given. In June, 1912, positive results were obtained in three of eleven cattle examined. The cultural forms are said to be identical with those described by most authors. Crithidial forms predominated. In one culture, seven to eight days old, typical trypanosomes were met with. The endoleucocytic forms described by BEHN were not seen.

A. G. B.

ROSENBLAT (Stephanie). **Über die Wirkung von gallensauren Salzen auf Trypanosomen.** [The Action of Bile Salts on Trypanosomes.]—*Arch. f. Anat. u. Physiol.* (Physiol. Abt.) 1912. No. 3-4. pp. 188-190.

The blood of mice infected with nagana was mixed with bile salts in various dilutions in test tubes. At intervals of five minutes the blood was examined fresh and stained. It was found that in certain dilutions the bodies of the trypanosomes were promptly dissolved, the last parts to disappear being the flagellum, blepharoplast, and nucleus. Experiments to ascertain whether this was a simple solution or a more profound change led the author to the belief that the change in the constituents of the trypanosomes must be profound. Experiments of treating infected mice with the above salts were without result.

A. G. B.

KINGHORN (Allan) & YORKE (Warrington). **Trypanosomes infecting Game and Domestic Stock in the Luangwa Valley, North-Eastern Rhodesia.**—*Brit. Med. Jl.* 1912. Nov. 2. pp. 1186-1188.

This paper appears to correspond in all essentials with one published in the *Annals of Tropical Medicine*, Vol. 6, No. 3. A. (see *Sleeping Sickness Bulletin*, Vol. 4. p. 321).

A. G. B.

YAWS.

Degorce & Mouzels. Le Pian chez les Annamites du Tonkin.—*Bull. Soc. Med.-Chirurg. de l'Indochine.* 1912. Oct. Vol. 3. No. 8. pp. 548-557.

This paper contains a detailed account of the clinical features of yaws presented by the Annamites. Amongst the natives the disease is known as "ghe còc," which signifies Toad's scab, and it is believed to be an act of vengeance by a dragon whose veins have been cut by the making of new roads.

The description of the clinical symptoms differs considerably from that of most authors; it resembles most closely the description given by Castellani and Chalmers. The malady is very contagious and when one member of a family becomes infected the remainder usually take the disease within a few months. In families it is generally the young children that first become infected, and they transmit the disease to their mother who infects the father. The yaws of Tonkin appears to differ from that described from other localities in the following main points:—The inconstancy of granulomata of the typical framboesial type; the frequence of lesions belonging to the circinate type; and the relative frequence of lesions of the scalp and scrotum.

Although it differs from syphilis in many points, the two diseases offer many analogies and the authors believe that yaws is really a form of syphillis modified by passage through different races. In Tonkin its symptoms seem to resemble those of syphilis much more closely than in many other regions. The authors state that the disease is readily cured in Tonkin by injections of arsenobenzol.

The article is accompanied by figures illustrating some of the circinate type of lesions.

Edward Hindle.

Stibbe (E. Philip). A Clinical Note on Yaws in the Pacific, with Consideration of its Relationship to Syphilis.—*S. African Med. Rec.* 1912. Oct. 12. Vol. 10. No. 19. pp. 418-419.

The author briefly discusses some of the clinical features of yaws in the Fiji Islands. Notes are given of four cases that presented lesions closely resembling syphilis, all of which were improved by treatment with increasing doses of potassium iodide.

In considering the relationship of yaws and syphilis the author lays emphasis on two facts:—(1) Fijians are apparently immune to syphilis and (2) practically all Fijians sooner or later acquire yaws. Consequently, it is suggested that the two diseases are related somewhat on the same lines as vaccinia and small-pox, and that an attack of yaws confers immunity against syphilis.

E. H.

Experimental.

Ranken (H. S.). A Note on "Granule-Shedding" in ***Treponema pertenue.*** [Memoranda.]—*Brit. Med. Jl.* 1912. June 29. p. 1482.

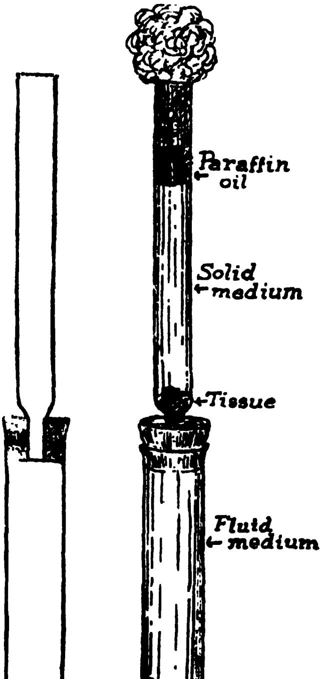
On examination of the spirochaete of yaws by means of the dark ground illumination, the author was able to observe the extrusion of small, highly refractile granules.

This species is said not to present any cork-screw motion like that of *T. pallidum*, nor any progressive motion. The granules are shot out by the lateral motion and immediately after extrusion are stationary, but they soon begin to rotate and make their way through the surrounding fluid. Although they are motile there is no suggestion of a flagellum being present.

E. H.

NOGUCHI (Hideyo). **A Method for Cultivating** ***Treponema pallidum*** **in Fluid Media.**—*Jl. Exper. Med.* 1912. August. Vol. 16. No. 2. pp. 211-215. With 1 text-figure.

The necessary apparatus consists of two tubes, the upper one being connected with the lower by means of a tube passing through a rubber stopper. The arrangement and relative sizes of these tubes are shown in the accompanying diagram. Both tubes are carefully sterilised, and in the lower one is placed one or two pieces of fresh sterile rabbit's kidney. The tube is then corked by the insertion of the upper half of the apparatus and a piece of sterile kidney put in the upper tube. The lower tube is now filled, by means of a pipette, with ascitic fluid or a mixture of ascitic fluid and bouillon. The syphilitic material is then inoculated into this liquid in the lower tube, and, in addition, some of it is poured over the tissue in the upper tube. Into the latter is now poured a mixture of 1 part ascitic fluid with 2 parts of slightly alkaline agar; this solidifies in the upper tube and when solid is covered with a layer of sterile paraffin oil. The whole is then incubated at 37° C.



This method is said to be very suitable for *Treponema pallidum*, *T. microdentium*, *T. macrodentium*, *T. refringens*, *T. mucosum* and *T. pertenue*.

E. H.

CASTELLI (G.). **Experimentelle und Chemotherapeutische Versuche bei Framboesia Tropica.** [An Experimental and Therapeutical Study of Yaws.]—*Zeits. f. Chemotherapie.* 1. Teil. Orig. 1912. Vol. 1. No. 2. pp. 167-201. With 4 plates.

After a short summary of the previous work on the experimental transmission of yaws to animals, the author mentions the work of NICHOLS, who was able to infect rabbits by intratesticular injection and also by subcutaneous injection into the scrotum.

Castelli has repeated this work and was able to produce typical chancres on the scrotum of rabbits by means of subcutaneous inoculations. The chancre developed after a variable incubation period, and by means of rapid passages through rabbits the virulence of the strain could be increased, as evidenced by the shortening of the incubation period. In addition rabbits were infected by intravenous injection of an emulsion of the testicle of a rabbit containing numerous spirochaetes. The method of administration was as follows:—The testicle of a heavily infected rabbit was ground up in normal saline, the whole being kept at 37° C., and after straining through muslin, the emulsion, containing numerous living spirochaetes, was injected into the superficial ear vein of a young rabbit. The first animal was injected on October 7th, 1911, a second time on November 8th, and again on November 25th. On December 10th a papule appeared at the base of the right ear, and on examination by means of puncture numerous spirochaetes were found at this site. In all, nineteen rabbits were infected in this manner, sometimes after only one injection, but more often after two or three. In those rabbits that became infected after one injection the incubation period varied from six to nine weeks. The symptoms are somewhat variable, but the first evidence of infection is generally the appearance of cutaneous papules on the head, and subsequently the animals always developed secondary symptoms, usually in the form of gummatous ulcers of the nasal cavity. In a few cases the testicles and scrotum were affected; only rarely was keratitis observed.

Rabbits infected with yaws both intratesticularly and intravenously, were treated by means of salvarsan and neosalvarsan respectively. The results obtained were very remarkable and show that both these drugs are very effective in the treatment of this disease. Neosalvarsan is to be preferred because of its slight toxicity, the *dosis tolerata* for a rabbit being 0·3 gms. per kilogram, whereas for salvarsan it is only 0·1-0·11 gms. per kilo. The action of neosalvarsan on localised infections of the scrotum is well shown in the case of three infected rabbits which received injections of 0·035 gms., 0·02 gms., and 0·015 gms. per kilo. respectively. In the first, the spirochaetes disappeared after three days and the chancre in 24 days; in the second the corresponding intervals were four days and 34 days; and in the last, five days and 25 days respectively. The effects of these compounds on rabbits infected intravenously were even more remarkable and in no case has any relapse been observed. The *dosis sterilisans* of neosalvarsan is only one tenth of the *dosis tolerata*.

Finally, Castelli discusses the question of the possible identity of yaws and syphilis and points out that up to the present, with the doubtful exception of serum diagnosis, there is no sure method of distinguishing these two infections. The general symptoms, papules, etc., following the intravenous injection of *T. pertenue* (yaws) into rabbits are so different from those after a similar injection of *T. pallidum* (syphilis) that the author believes that this method may be of use for differentiating them.

The paper is illustrated by excellent plates showing the development of papules on infected rabbits and other pathological features of the experimental infections.

E. H.

TREATMENT.

SABELLA (Pietro). **La Framboesia Tropicale a Tripoli e la sua Cura col Neo-salvarsan.**—*Policlinico.* Sez. pratica. 1912. August 25. Vol. 19. No. 35. pp. 1261-1265.

The author gives an account of the treatment of ten cases of yaws with intravenous injections of neosalvarsan. The treatment was most successful, one of the most striking examples being that of a family, father, mother and a 13 year old son, all suffering from the disease. The father was covered with nodules and had been affected for five years, during which time he had tried all the native specifics without effect. The mother suffered from a simple nodular eruption diffused over the whole body, whilst the boy presented a few lesions about the scrotum and between the thighs, and the anus was surrounded by a papillomatous eruption. The father received 0·70 gms. of neosalvarsan intravenously, and the other two patients 0·40 gms. each. The effect of the drug was marvellous. In 15 days the father was completely cured; the others in shorter periods.

With the exception of the above cases all the patients received 0·40-0·50 gms. of neosalvarsan intravenously. To only one patient was it necessary to give a second injection, in all the other cases the cure being effected by a single dose.

In addition, the author discusses prophylactic measures against this disease in Tripoli. He points out the necessity of strictly isolating all cases and at once treating them by means of arsenicals.

E. H.

BORN. **Salvarsan bei Syphilis und Frambösie.**—*Arch. f. Schiffs- u. Trop. Hyg.* 1912. August. Vol. 16. No. 16. pp. 560-562.

This article contains an account of the treatment of 10 cases of syphilis and one of yaws by means of intra-muscular injections of '606.' A three year old boy suffering from yaws was injected with 0·2 gms.; eight days later the pustules, which previously covered his body, had disappeared except for slight discolourations of the skin. An abscess formed at the site of injection and had to be removed; the wound did not heal for some weeks.

E. H.

PERRY (A.). **Report by the Principal Civil Medical Officer on the Use of Salvarsan (606) in the Treatment of Yaws. Ceylon.** Received in Colonial Office, September 28th, 1912.

The results recorded in this report show that salvarsan is an effective cure for yaws (known as "parangi" in Ceylon) in every stage of the disease, with the possible exception of tertiary cases in which destruction of bone has occurred. Cases treated with one injection seven months previously have shown no tendency to relapse. In all, 54 cases were treated, adult men and women and also young children. The doses used for adults varied from 0·3 to 0·6 gms. of salvarsan and the drug was injected either intramuscularly or intravenously. The results obtained are "little short of miraculous"; granulomata disappear very rapidly, bone pains vanish in about three days, and deep tertiary ulcers usually heal in about three weeks. In three tertiary cases, with deep ulcers on the leg and necrosis and enlargement of the bone, no improvement was noticed as a result of the injections even though one of them received a second dose. In only one case was an abscess formed at the seat of injection, but this healed within a week, so that from this point of view the intramuscular mode of injection has not given such unsatisfactory results in Ceylon as in the hands of MOUZELS and NGUYÊN-XUAN-MAI in Annam (see this *Bulletin*, p. 35).

E. H.

COCKIN (R. P.). **Report on the Treatment of Twenty-two Cases of Yaws, by Salvarsan Injections, at the Yaws Hospital, St. George's, Grenada, W.I.**—*Jl. Trop Med. and Hyg.* 1912. Sept. 16. Vol. 15. No. 18. pp. 277-278.

The author has treated 22 cases of yaws by means of intramuscular (gluteal) injections of salvarsan and obtained very favourable results. In only one case was it necessary to give a second injection, all the others being cured by one dose. In two of the patients, aged respectively six and seven years, some degree of arsenical poisoning followed the injection, but both eventually recovered and were discharged 27 days after the administration of the drug. In none of the patients were any abscesses formed at the site of injection, and the pain caused was not excessive. The spirochaetes were found to disappear from the tissues within 48 hours, except in the case of the patient who required a second injection, after which the parasites disappeared.

A table is given showing the history of each patient and the result of the treatment, from which the average stay in hospital after the injection is seen to be 25 and a half days, a great improvement on the average of about three months with other modes of treatment. Moreover, two of the patients suffered from chronic yaws and had been in hospital for seventeen and eighteen months respectively, previous to the injection of salvarsan; after this treatment the first patient was discharged as cured in nineteen days and the other in seventeen days.

E. H.

HUGHES (A. F.). **The Use of Salvarsan at the Yaws Hospital, Soufrière, St. Lucia (Windward Islands).**—Report to the Secretary of State for the Colonies. Received in Colonial Office, October 1, 1912.

This report contains a brief account of the results obtained in the treatment of yaws by salvarsan at the Yaws Hospital, St.

Lucia (West Indies). In all, 112 cases were treated, of which 83 have been discharged as cured after an average stay in hospital of 27 days. The remaining cases have not yet been under treatment sufficiently long. Under the old method of treatment the average duration in hospital was three months, and therefore a considerable saving is effected by the use of salvarsan. In patients over fourteen years of age 0·6 gm. of the drug was injected intramuscularly and the author advises the use of 0·8 gm. At first subcutaneous injections were employed, but were discontinued as they gave rise to necrosis at the site of injection. After treatment the patients were made to lie up for 48 hours and then compelled to bathe regularly in the sea. Meanwhile mercury was administered in fairly large doses. The effects of the treatment are marvellous, for usually after 48 hours the crusts shew signs of drying up and in some cases the patients are completely cured within a week or so. In a few cases two or three injections were necessary in order to effect a cure, but this only occurred after subcutaneous injections. No cases of recurrence have yet been noted, but sufficient time has not elapsed to express any definite opinion. A patient treated by Dr. Nicholls reported that the disease had relapsed, but in this case only 0·4 gm. of the drug had been employed. Finally, the treatment has a very beneficial effect on the minds of the patients, who become much more cheerful and happy. It is noteworthy that this mental effect is experienced even in cases of leprosy where the drug has no appreciable action on the course of the disease.

E. H.

*PROTOZOOLOGY.

GENERAL.

TODD (J. L.) & WOLBACH (S. B.). **Parasitic Protozoa from the Gambia.**—*Jl. of Med. Research.* 1912. June. Vol. 26. No. 2. pp. 195-218. With 3 plates.

The Memoir forms the Second Report of the Expedition of the Liverpool School of Tropical Medicine to the Gambia, 1911. Besides observing *Trypanosoma gambiense*, various malarial parasites in man, trypanosomes in cattle and horses, and *Trypanosoma lewisi* in various rats, the authors made observations which they summarise thus:—

> "The following is a list of the parasites found . . . . together with the hosts:
>
> Trypanosome in a hornbill (*Lophoceros nasatus*)
> " " dove (*Streptopella vinacea*)
> " " bush fowl (*Francolinus* sp.)
> " " lizard (2 species) { *Agama colonorum*, *Lygosoma* sp.
> Spirochaetes in an antelope (*Hippotragus equinus*)
> Piroplasmata " " " "
> Leucocytozoon in a bush fowl (*Francolinus* sp.)
> Halteridia in birds of 9 species:—*Vinago nudirostris, Streptopella vinacea, Turtur senegalensis, Numida meleagris, Lissotis melanogaster, Ptilopachus fuscus, Francolinus* sp., *Balearica pavonina, Neophron monachus*
> A pigmented hemacytozoon in a lizard (*Agama colonorum*)
> Hemogregarines in a monitor (*Varanus niloticus*)
> Leucocytogregarina in a vulture (*Neophron monachus*)."

The piroplasma observed in the roan antelope seems "most nearly related to those which have been called *Theileria* in the classification of the piroplasms proposed by França . . . In the event of this being a new species, the name *Theileria hippotragi* is proposed for it." Should the leucocytogregarine from the vulture prove a new species, the name *Leucocytogregarina neophrontis* is proposed for it. Curious flagellated organisms were also found in stained preparations of heart blood of the roan antelope, which might have resulted from contamination from the alimentary tract. Trichomonads were found in a stained preparation of blood of a bush fowl, probably from the alimentary canal.

The memoir is very well illustrated by three coloured plates.

H. B. Fantham.

PLIMMER (H. G.). **On the Blood-Parasites found in Animals in the Zoological Gardens during the four Years 1908-11.**—*Proc. Zool. Soc. Lond.* 1912. June. Part 2. pp. 406-419. With 7 plates.

The author has examined the blood of every mammal, bird, reptile, and batrachian that died in the Zoological Gardens, London, from 1908 to 1911, 6,430 animals in all, of which 497 harboured blood parasites.

Many of the parasites are recorded here for the first time. In other cases the host is new. None of the parasites are named, the

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*** Some of Dr. FANTHAM's contributions to this Section are held over for want of space.**

author protesting (and justly) against the practice of naming as a new species every similar parasite found in a new host. The protozoal parasites include a spirochaete, trypanosomes, *Hexamitus, Trichomonas,* haemogregarines, plasmodia, *Haemocystidium, Haemoproteus* and leucocytozoa. Detailed tables showing the popular and scientific name of the hosts, their geographical situations, and the nature of the parasite constitute the bulk of the paper.

A spirochaete—resembling *S. recurrentis*—was found in the blood of a green monkey (*Cercopithecus sabaeus*).

Trypanosomes occurred in 50 mammals, 7 birds and 3 amphibia, the Fat Mouse, *Steatomys pratensis,* being a new host for a trypanosome of the nagana type. The parasitised birds harboured a trypanosome of the *T. avium* type. The birds showed anaemia and their spleens were large. A full list of hosts is given. The Batrachian trypanosomes were of the type *T. rotatorium,* Gruby.

The author notes that, in cases of ulceration of the intestine when the gut wall is permeable, flagellate parasites may leave the gut, and reach the blood stream and live, as exceptional occurrences, in the blood stream. He has found such intestinal flagellates belonging to the form *Hexamitus* in the blood of frogs and tortoises, while a species of *Trichomonas* is similarly parasitic in the blood of certain snakes. DANILEWSKY was the first to record the presence of intestinal flagellates in the blood. A full list of the Batrachia and Reptilia observed by Plimmer as harbouring such parasites is appended.

Haemogregarines were found in 150 reptiles of 67 different species and in 41 of these were recorded for the first time. Plimmer states that the schizonts were especially in the erythrocytes and that schizogony often occurred in the lungs of the host. A new type of haemogregarine was found in the Bengal monitor. The parasite divides the nucleus of the host cell into two parts which remain connected by a very fine strand; the schizogony (which from the figures seems to be on a large scale) occurs in the lungs. As before a full list of hosts with very brief comments on the parasites is given.

Members of the *Plasmodidae* were found in one mammal and many birds. Among the birds, *Plasmodium praecox* is noted as being deadly to the host, producing marked anaemia with considerable spleen enlargement and changes in the bone marrow. Twenty different species of birds are named as harbouring the parasite.

Haemocystidium is noted as being present in five different species of reptiles, of both the New and Old World.

Haemoproteus danilewskyi was found in 69 birds of 48 different species, in 46 of which it had not been recorded before. The birds came from Africa and America. A full list of hosts is given. The author recalls that the brothers SERGENT and ARAGAO have stated that the principal host of *H. danilewskyi* is a fly, *Lynchia maura.*

The paper closes with a note on the occurrence of spindle-shaped, unpigmented leucocytozoa in two new hosts, *Fuligula marila* and *Francolinus levaillanti.* The parasite is rare.

The earlier part of the paper deals with the parasitic worms (microfilaria) found in the blood of the animals examined (see this *Bulletin* No. 2, p. 94).

H. B. F.

PROWAZEK (S. v.). **Beiträge zur Kenntnis der Protozoen und verwandter Organismen von Sumatra (Deli).** [Protozoa and Allied Organisms from Sumatra.]—*Arch. f. Protistenkunde.* 1912. July 22. Vol. 26. No. 2. pp. 250-272. With 3 plates and 1 text-figure.

In this paper the author gives notes on herpetomonads, gut flagellates, surra and some haemogregarines, and on the development of leucocytozoa and chlamydozoa seen by him in Sumatra.

Regarding herpetomonads, Prowazek maintains the accuracy of his previous work on these parasites, nor does he admit the possibility of having dealt with mixed infections of flagellates.

Flagellates from the intestines of Europeans, Samoans, Caroline Islanders, Chamorrs, Chinese, and Malays, also from monkeys, pigeons, snakes, lizards, and frogs were examined. The commonest organisms was *Fanapepea.* Trichomonads of the usual type were seen. Autogamy is stated to be rare among them. Cysts which were not part of the life-cycle of the trichomonads were also seen.

Surra was found to be sporadic in many places in Sumatra. Subinoculations in guinea-pigs showed a diminishing, inconstant virulence. The pathological effects are noted. In the spleen of the host macrophagocytosis occurs. Here also leishmania-like involution forms, quite distinct from degeneration forms and capable of division, occur. Some indications of dimorphism, in which short broad forms are uncommon, are present. The strain of trypanosomes had somewhat smaller dimensions than usual, life measurements being 19·8 μ to 21·5 μ.

Two species of haemogregarines from *Bufo melanostictus* are recorded; the smaller, the more numerous form, is usually encysted but forms have been seen to leave the cyst. The larger parasite is usually free. *Crocodilus palustris* Cuv. and *Varanus bivittatus* Dum. and Bibr. also harboured haemogregarines.

Haemogregarina pythonis occurred in numbers in *Python reticularis.* Sexual forms and large and small schizonts were seen.

Prowazek also describes stages in the life history of a haematozoön of a fowl, which he believes to belong to the life-cycle of a Leucocytozoon. The Leucocytozoon of the Sumatran fowl varies between 44·6 μ and 66 μ, the long horns being included. Male and female forms are described. Resting forms are of two types: (1) agamonts, usually 1 to 4 in number in the host-cell, (2) club or bean-shaped forms which but slightly displace the nucleus of the host cell. True schizogony is not known. A large and a small trypanosome also occur in the Sumatran fowl, and Prowazek produces arguments which he believes indicate that the leucocytozoa and trypanosomata are parts of the life cycle of the same organism.

Toxoplasma-like forms were found in one smear of fowl's blood, and *Proteosoma*, while a pigeon harboured a small trypanosome, probably *T. avium*.

Chlamydozoa are briefly dealt with in conclusion.

[The arguments advanced by Prowazek regarding the trypanosome nature of the Leucocytozoon appear based on very artificial treatment of the organisms—treatment with saponin and staining reactions. His views regarding the relation of the blood cell and the parasite are much those of SCHAUDINN and do not accord with those of more modern workers; as Prowazek says, more investigation of the subject is desirable.]

H. B. F.

CARINI (A.) & RUDOLPH (Max). **Sur Quelques Hématozoaires de Lézards au Brésil.**—*Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 592-595.

The lizards examined were captured in the State of Minas Geraes. Three Protozoa are described.

1. *Haemogregarina ameivae.*—Found in the blood of *Ameiva surinamensis.* The haemogregarine measures 11 to 13μ by 3 to 4 μ. It arranges itself usually along the long axis of the red cell, displacing the nucleus of the host cell to one pole. The nucleus of the red cell may be slightly hypertrophied and deformed.

2. *Plasmodium minasense,* an endoglobular pigmented parasite found in the blood of *Mabuia agilis.* It is round or oval and situated at one pole of the red cell. The larger parasites measure 4 to 5μ in diameter. Dividing parasites were rarely seen. A schizont with four nuclei is figured.

3. *Trypanosoma* sp.?, from the blood of *Mabuia agilis,* seen only in stained preparations. The flagellate is not figured, but is described as flat, stumpy, and often rolled up. It measures 15 × 20μ. The blepharoplast is near the nucleus.

The trypanosome is like *T. perroteti* found by FRANÇA in *Mabuia perroteti* in Portuguese Guinea.

H. B. F.

FLAGELLATES OF INVERTEBRATES.

i. CHATTON (E.) & DELANOË (P.). **Observations sur l'Evolution et la Propagation de** *Crithidia melophagi* **Flu.**—*Compt. Rend. Soc. Biol.* 1912. June 14. Vol. 72. No. 21. pp. 942-944.

ii. CAUCHEMEZ (L.). **Recherches sur la Transmission héreditaire de** *Crithidia melophagi* **Flu.**—*Loc. cit.* July 5. No. 24. pp. 1062-1064.

These two papers deal somewhat shortly with one of the most difficult problems of protozoology, namely the question of hereditary infection.

i. Chatton and Delanoë make a short comparison of the morphology of *C. melophagia* with the *Leptomonas* and trypanosomes of Drosophila. No stages with the blepharoplast terminally posterior (comparable to trypanoid forms of *Leptomonas*) nor forms like the small trypanosomes of *T. drosophilae* occur in the mid-gut of *Melophagus*. On the contrary, in the hind-gut gregarine-like forms of *C. melophagia* pass through a stage with blepharoplast and nucleus posterior, corresponding to the spermoid stage of *Leptomonas*. The spermoid forms encyst and are shed in the faeces.

Regarding propagation, Chatton and Delanoë have seen no evolutionary forms of the flagellates in the ovaries or in the puparia. They also state that all freshly hatched *Melophagus* are uninfected. 23 sheep keds, hatched from isolated and washed puparia, were fed for 6 to 18 days on a sheep whose skin had been disinfected. The young keds did not become infected, while 33 out of 35 control keds showed infection. The authors doubt hereditary infection of *C. melophagia* and lay stress on contaminative infection.

The authors do not consider that *C. melophagia* has any connection with the trypanosome found in sheep's blood, thus agreeing with SWINGLE (1911).

ii. The paper by Cauchemez has much the same line of argument. Records are given of negative results obtained from 22 young *Melophagus* (fed on guinea-pigs with disinfected skin).

[Regarding the remarks of Messrs Chatton, Delanoë, and Cauchemez, it is necessary to point out that:—

(1) The specific name of the parasite is not *melophagi*, but *melophagia* (Flu). This point is explained on p. 211 of Miss PORTER's(1) paper.

(2) SWINGLE,(2) although asserting that " the only natural mode of infection is transmission through the egg," yet admits that infection may occur through the faeces by cysts, such as he actually figured in his Plate 5 (Figs. 19-21).

(3) PORTER never stated that the essential mode of propagation of the parasite is not intestinal but hereditary. On the contrary she writes (p. 213): " Infection of *Melophagus ovinus* with *C. melophagia* is either hereditary or casual. In the case of casual infection the insects ingest the post-flagellates voided with the faeces of other *Melophagus*." Again (p. 207): " I do not agree with SWINGLE that casual infection is only a remote possibility; to my mind it is a certainty." Miss PORTER also mentions a cannibalistic method of propagation.

(4) Regarding the French authors' statement that no parasite was seen in the ovaries or the puparia, it should be pointed out that rounded stages of the *C. melophagia* have been seen therein by FLU(3), SWINGLE, and PORTER. The last mentioned author states (pp. 206, 212) that the forms seen in the freshly hatched *Melophagus* are rounded and do not flagellate until the insect has sucked blood.

(5) Further, allied flagellates (e.g., *C. gerridis*, *H. muscae domesticae*) occur in the ovaries of other insect hosts, though they may not penetrate the ova.]

H. B. F.

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[1] PORTER (1910).—*Quart. Jl. Microsc. Sci.*, Vol. 55, p. 189.
[2] SWINGLE (1909).—*Jl. Infect. Diseases*, Vol. 6, p. 98.
[3] FLU (1908).—*Arch. f. Protistenk.*, Vol. 12, p. 147.

ROBERTSON (Muriel). **Notes on some Flagellate Infections found in Certain Hemiptera in Uganda.**—*Proc. Roy. Soc.* 1912. June 14. Series B. Vol. 85. No. B578. pp. 234-240.

The writer while working at Mpumu examined certain Hemiptera from the surrounding country. The hosts included *Leptoglossus membranaceus*, Fab., *Dysdercus casiatus*, *Carbula jipensis*, an unnamed reduviid bug, and an unnamed capsid bug. So far none of the species are known to attack man or other vertebrates. The flagellate parasites belong to the herpetomonad or crithidial type. Their life cycles are incomplete; hence generic names are not given. " The term herpetomonas " is used " to describe all flagellates without an undulating membrane, crithidia for forms with a membrane and with the kinetonucleus anterior to the trophonucleus."

The herpetomonas of *Leptoglossus membranaceus*, Fab. is parasitic in the gut and salivary glands of this plant-feeding bug, but has not been found in the plant. It is long and slender, with a large nucleus containing either a karyosome or chromatin granules. There is no connection " between the karyosome and the membrane " in the granular condition of the karyosome. The body of the long herpetomonads is markedly flexible. The author regards the long slender forms as derived from short thick ones. No crithidial forms were found in the bug. The salivary glands were frequently heavily infected with flagellates showing a considerable range of form. Young specimens of the bug show only gut infections. [No details are given of the condition of the flagellate in the hind gut and rectum of the bug.] Miss Robertson regards the salivary infection of *Leptoglossus* as showing " the independent development in a sucking insect of all the factors requisite for the transmission of a flagellate, parasitic in the intestine, by way of the mouth parts of the insect host."

Leptoglossus also harbours a Coccidian whose schizogony occurs in the salivary glands. Motile sickle-shaped individuals occur in the proboscis.

Dysdercus casiatus, the red cotton bug, was found to be occasionally infected in the gut with a typical herpetomonas.

Carbula jipensis shows rare and slight infection with herpetomonads also.

The reduviid bug and capsid bug contain both crithidial and herpetomonad forms. Miss Robertson believes that these are two forms of one and the same organism, the crithidial forms being transitory youth forms, the long herpetomonads adult forms, but admits that there is very much to say in favour of the opposite view and so leaves the matter an open question.

The capsid bug " is found in or near forest and is of the same light brown colour as the fallen leaves on which it runs. Its food is not known and it is apparently not a very common bug." The reduviid bug is red and black; it " is a common species and feeds on small bugs and on other insects.'

The paper is illustrated by 32 text-figures.

H. B. F.

Hindle (E.) & Lewis (R. C.). **Note on "*Crithidia*" *cleti* n.sp., Parasitic in the Alimentary Canal of *Cletus varius* Dall.** —*Parasitology*. 1912. June. Vol. 5. No. 2. pp. 109-113. With 17 text-figures.

Hindle (E.). **What is the Genus** *Leptomonas*, **Kent?**—*Ibid.* pp. 128-134.

The organism referred to as "*Crithidia*" *cleti* by the authors has been observed in stained specimens only of preparations of the gut of *Cletus varius* Dall., a bug from the Transvaal. The preflagellate forms are somewhat irregular, 7 μ long by 3·5 μ broad. The trophic nucleus is large, horseshoe-shaped and deep staining. The structure termed the end bead of the organism was found dividing on one occasion in addition to the nuclei. The flagellates were numerous, often in process of multiplication. The nucleus is usually situated midway in the cytoplasm and may show a central karyosome or more often a series of granules. The position of the kinetic nucleus varies, but it is usually near to and anterior to the nucleus. The total dimensions of the typical flagellate are 25 μ long by 2 μ broad, total length of flagellum 16 μ, length of free flagellum 4 μ. Division is of the usual type commencing at the anterior end. The formation of the post-flagellate stage has only been observed in a single specimen, which may be a degenerating form. The cysts when fully formed are usually spherical, about 3 μ in diameter.

The authors express doubt as to what name should be given to the parasite, which undoubtedly comes within the genus *Crithidia* of Patton, and give as reason for this course views published by one of them in a subsequent paper (see below): —

[There is no reason really in this lack of definite position, for in the consideration of the genus *Leptomonas* of Kent the genus *Crithidia* (as emended by Patton) is not concerned. The only other genus concerned is *Herpetomonas*. The authors therefore need not have hesitated to call the parasite *Crithidia cleti*, more especially as it occurs in a bug that feeds only on the juices of plants.]

The second paper not only asks a question, but also leaves it unanswered. It consists of an historical résumé similar to that published by many previous workers, but in addition invokes the "Law of priority" in the "International Code of Zoological Nomenclature" to confute the work of Bütschli, who used the generic name *Herpetomonas* in preference to *Leptomonas*, though Kent happened to describe *Leptomonas* two pages before *Herpetomonas* in his "Manual of the Infusoria."

Hindle desires a new study of the type, *Leptomonas bütschli*, from *Trilobus gracilis*.

[At the time Bütschli wrote such a rule was not emphasised, and Bütschli can hardly be blamed for using the generic name that was best defined. Further, zoologists are not of one mind on the strict applicability of such a rule, a circular calling for expressions of opinion on the subject having been sent out as recently as last June. The argument of the possibility of a crithidial stage existing in the type species of *Leptomonas*, as described by KENT when founding the genus, is at present speculative—there is no definite evidence.]

H. B. F.

CARDAMATIS (J. P.). **Des Flagellaires dans la Mouche Domestique. Identité de la Leptomonade et de l'Herpétomonade. Nouveau Mode de Multiplication de l'Herpétomonade de la** *Musca domestica*.—*Centralbl. f. Bakt.* 1. Abt. Orig. 1912. July 3. Vol. 65. No. 1-3. pp. 66-76. With 4 plates.

The author commences with a brief review of some of the literature relating to members of the genera *Trypanosoma*, *Herpetomonas*, and *Crithidia*. He points out the polymorphism existing among members of the two latter genera, and certain similarities between flagellates with a trypanosome facies found in some flies and the *Leptomonas* of CHATTON and ALILAIRE, who found parasites of forms intermediate between the two. He also states that *Trypanosoma granulosum*, parasitic in eels, becomes a young leptomonad form in the leech *Hemiclepsis marginata*, but on the 14th day after deglutition these forms are reconverted into small trypanosomes. Hence he concludes that the relation between herpetomonads and trypanosomes is established.

Reviewing the question as to the number of flagella present, the author agrees with many other workers that primitively *Crithidia* and *Herpetomonas* are uniflagellate. He has seen forms with two rhizoplasts in cultures, but sometimes the two united later. With WENYON he is in accordance as to a thin membrane sometimes connecting the two flagella, and that sometimes a new rhizoplast appears to grow concurrently with a new flagellum. The latter case, he considers, merely shows the great tendency of the organism to multiply intensively by division, and that it is superfluous to make a distinction between leptomonads and herpetomonads based on the single or double character of the flagellum. If this distinction be suppressed, the monoflagellate is the young form and the biflagellate condition marks not only the period of most active multiplication but also the end of the flagellate stage of existence.

A detailed account of the behaviour of cultures of the flagellates of the house fly is given. The cultures seem to pass through the preflagellate to flagellate and post-flagellate stages in about 8 days. On the 10th day many young forms appear due to active division during the postflagellate stage (1) by schizogony; (2) by thickening of the protoplasm without apparent schizogony; (3) by protoplasmic prolongations; (4) by gemmation; (5) by bipartition of young parasites.

On the 20th day of the culture remarkable forms are found, some large and spherical with a large nucleus, which Cardamatis terms females, others smaller which he terms males.

[Whether the sequence of events described occurs also in the house fly is a matter of some doubt, and it would seem that much more value is to be attached to stages actually observed in the intestine of the fly than to forms obtained by culture in broth or serum, which naturally can be regarded only as an artificial environment.]

H. B. F.

FANTHAM (H. B.). **Note on the Occurrence and Distribution of** *Herpetomonas pediculi.—Ann. Trop. Med. and Parasit.* 1912. Oct. 18. Vol. 6. No. 3. B. pp. 403-404.

The author refers to his previous paper (*Proc. Roy. Soc.*, 1912, B. Vol. 84, pp. 505-517) on *Herpetomonas pediculi*, where this parasite was first recorded from the gut of the human body-louse in England, and where its life cycle was described in detail. The flagellate is a natural parasite of the louse, as was shown by breeding and feeding experiments.

The author has now found the Herpetomonas in the digestive tract of head lice in England, and records its occurrence in body-lice in Bombay (seen by Capt. MACKIE) and in Tunis (seen by Dr. BLAIZOT). Its distribution, therefore, is wider than was at first suspected.

H. B. F.

RODHAIN (J.), PONS (C.), VANDENBRANDEN (J.) & BEQUAERT (J.). *Leptomonas pangoniae*, **Parasite de** *Pangonia infusca.—Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 604-608.

The flagellate occurs in the intestinal tract of the Tabanid fly, *Pangonia infusca*, found in the Congo State. The flies occur at the end of the wet season along the beds of the drying rivers. The females feed on the blood of man or of mammals. The males examined were not parasitised, but nearly 40 per cent. of the females contained flagellates; usually parasites occur only in those females which have had at least one meal of blood.

The flagellates are most abundant in the posterior part of the intestine, in the blackish liquid contents. In the terminal part of the intestine there are fixed cystic forms. The cysts contain nucleus and blepharoplast. No preflagellate stages were seen in the anterior part of the intestine, and no parasites occurred in the intrathoracic part of the gut. *Leptomonas pangoniae* have been inoculated into a sheep, a rat, and a mouse, but no parasites were found in the blood of these mammals. They were also mixed with goat's blood and *Glossina morsitans* were fed on the mixture. The intestines of the flies examined 24 to 72 hours after showed no living parasites. Defibrinated goat's blood also rapidly killed the flagellates.

The authors consider that *Leptomonas pangoniae* is a parasite peculiar to the tabanid host. It is difficult to test this experimentally, as flies kept in captivity regularly die after 3 days.

[It is to be regretted that the paper is not illustrated by text figures. These are especially desirable where forms stated to be intermediate between two genera are mentioned briefly in three lines.]

H. B. F.

HAEMOGREGARINES.

LEGER (André). i. **Leucocytozoaire de l'Hyéne tachetée du Haut-Sénégal et Niger.**—*Compt. Rend. Soc. Biol.* 1912. July 5. Vol. 72. No. 24. pp. 1060-1062.

ii. **Présence de Deux Leucocytozoaires Morphologiquement Distincts dans le Sang du Chien, à Bamako (Haut-Sénégal et Niger).**—*Ibid.* Oct. 25. Vol. 73. No. 29. p. 376.

i. A leucocytozoon was observed by the author in the blood of one *Hyena crocuta* out of six examined. The animal exhibited no sign of illness during two months of observation. The parasitised leucocytes always averaged 1 to 2 per cent. The organism was seen in both fresh and stained preparations. In the latter the adult form is clearly ovoid; its extremities are rounded, but one extremity is more elongated than the other. The average size is 8 μ by 6 μ. The parasite is usually surrounded by a capsule. The nucleus, about 3μ in diameter, occupies usually the broader extremity of the ovoid body. The host cell appears to be a mononuclear leucocyte, but the nucleus of the host cell is distorted by the parasite and may appear like that of a polymorphonuclear. Free forms were never seen in the blood. Up to the present attempts at inoculation of the parasite from hyaena to hyaena and from hyaena to dog have failed. The parasite differs in size from *H. canis* and *H. canis adusti*, and is nearer to *H. rotundata* recorded by PATTON from *Canis aureus*. However, A. Leger considers the parasite of the hyaena worthy of specific rank and names it *Haemogregarina chattoni*.

ii. The author refers to the above note. He has now found this leucocytogregarine (*H. chattoni*) in the mononuclear leucocytes of 2 dogs out of 114 examined around Bamako. No free forms of the parasite have yet been seen.

H. chattoni differs from *H. canis* in size and form, being smaller, shorter, and more stumpy. *H. canis* was found in 4 dogs out of the 114 examined.

H. chattoni and *H. canis* have not yet been found to occur together in the same dog.

H. B. F.

SANGIORGI (Giuseppe). *Leucocytogregarina musculi.*—*Centralbl. f. Bakt.* 1. Abt., Orig. 1912. Sept. 19. Vol. 66. No. 2-4. pp. 287-293. With 1 plate.

The parasite was found by the author in white mice, apparently in Turin. It is the same as that discovered by Dr. Annie PORTER in white mice in London in 1908.

Sangiorgi found the parasites to be numerous in the lungs, fewer in the peripheral blood, bone-marrow and liver, and rare in the kidney and the spleen. The parasites were often free in the blood-plasma, only a few occurring in the mononuclear leucocytes. They measure 9·4 μ to 14·2μ by 4·7 μ to 6·3 μ. The nucleus is generally eccentric. A cytocyst may be present. In the lungs somewhat thinner forms are seen, 7 μ to 8·5 μ by 3·1 μ to 5 μ.

Various multiplicative stages were observed in the lungs in two heavily infected mice. In poorly infected hosts these stages are not found. Schizogony occurs in the lungs, sometimes within a leucocyte, sometimes free in the plasma. The author compares the distribution and life history of the parasite in his mice with those found by PORTER in considerable detail. The latter found schizogony in the bone-marrow.

The louse, *Haematopinus spinulosus*, acts as a mechanical carrier of the parasite from mouse to mouse.

H. B. F.

MICROSPORIDIA.

FANTHAM (H. B.) & PORTER (Annie). (i) **Microsporidiosis, a Protozoal Disease of Bees due to *Nosema apis*, and popularly known as Isle of Wight Disease.—(ii) The Morphology and Life History of *Nosema apis* and the Significance of its Various Stages in the so-called "Isle of Wight" Disease in Bees (Microsporidiosis).—(iii) The Dissemination of *Nosema apis*.**—*Ann. Trop. Med. and Parasit.* 1912. July 31. Vol. 6. No. 2. pp. 145-214. With 3 plates.

The cause of " Isle of Wight " disease in bees was discovered by the authors in 1906 to be a minute Microsporidian parasite, *Nosema apis*. The disease is now known to be more widely distributed and is termed microsporidiosis.

Nosema apis is, chiefly, a parasite of the alimentary tract of the bee, but can invade the body cavity or haemocoel and multiply therein. Spores of the parasite, swallowed with food or drink by the bee, give rise each to an amoeboid parasite, the planont, which parasitises either an epithelial cell of the gut or else reaches the haemocoel. In either case it becomes rounded, grows and feeds for a time, and then commences to multiply.

The process of multiplication is termed merogony and the dividing form is called the meront. Daughter meronts are formed by binary fission, producing clusters or chains. Each daughter meront is ultimately uninucleate. The meront stage of the parasite is often deadly to the host, in which case the parasite cannot attain its full development, the spore. Merogony causes derangement of the bees' digestive processes.

The second or propagative stage of the *Nosema* life-cycle, known as sporogony, serves for the transference of the parasite to new hosts. The full-grown meront becomes the pansporoblast or sporont, which undergoes complicated nuclear changes whereby five nuclei are ultimately produced. The sporoblast forms two vacules, an anterior one, called the polar capsule, and a posterior vacuole in which the polar filament is coiled. The secretion of the sporocyst converts the sporoblast into the spore. The great power of merogony compensates for the formation of but one spore from the pansporoblast.

The symptoms of microsporidiosis vary. Inability to fly, crawling, dislocation of the wings, abdominal distension, and " dry dysentery " followed by early death may be noted. Warm, bright weather favours the bee, wet or damp aids the parasite. Bees weak after hibernation rapidly succumb.

Nosema apis has been proved fatal by feeding hive bees, mason bees, and wasps on honey containing *Nosema* spores; by smearing infected excrement on healthy bees and allowing them to clean themselves; by uniting healthy and infected bees; by placing healthy bees in cases in which infected stock had travelled.

In nature, the method of infection is contaminative. Hives comb, honey and pollen from comb have all been found to contain *Nosema* spores. Bees' drinking places infected with *Nosema* spores have been observed. Flowers, water from foliage, and dew from low plants near infected hives all have contained spores, Wind can act as a distributor of *Nosema* spores, also ants and wax-moths. Some bees can adapt themselves somewhat to the parasite, which forms many spores within them. Such parasite carriers act as reservoirs of disease.

In the treatment of the disease preventive measures seem of most value. The only certain destructive agent for *Nosema* spores is fire. All dead bees should be burned. Old comb and hives untreated by a painter's lamp after disease are to be avoided. Weak stocks should not be united. Great care should be exercised in importing bees whether from other places in the British Isles or abroad. Liming the soil around each hive is of service. Provision of abundant honey and pure water supply, together with scrupulous cleanliness of the hive and its surroundings, are great aids in the prevention of microsporidiosis.

[It is to be regretted that, so far, no Microsporidia pathogenic to Glossina have been found. If such occur, they might be utilised in exterminating Glossina.]

H. B. F.

CARDAMATIS (J. P.). **De Quelques Microsporidies chez la Mouche Domestique.**—*Centralbl. f. Bakt.* 1. Abt. Orig. 1912. July 3. Vol. 65. No. 1-3. pp. 77-79. 1 plate.

The author has found stages of some Microsporidian in the intestine of flies allowed to feed on matter from an oriental sore (*Bouton d'orient*). Some stages of the parasite resemble piroplasms, others Leishman-Donovan bodies. Some are extremely small, others large. A nucleus is, as a rule, only demonstrable after prolonged staining with Giemsa. Some parasites multiply by budding. Others become annular, showing a nucleus and blepharoplast of different staining reaction. The annular forms may become elongate. The author states that some of the parasites resemble stages of *Schizotrypanum* or of *Octosporea muscae domesticae.* Whether the parasites thus briefly described are connected with the life history of the herpetomonad of the fly or with the Microsporidia described by various writers, the author says he cannot decide, but he emphasises the fact that the host flies had fed on matter from ulcers of oriental sore.

H. B. F.

CLASSIFICATION OF FLAGELLATES.

ALEXEIEFF (A.). **Sur Quelques Noms de Genres des Flagellés qui doivent disparaître de la Nomenclature pour Cause de Synonymie ou pour Toute Autre Raison. Diagnoses de Quelques Genres récemment étudiés.**—*Zool. Anzeiger.* 1912. June 25. Vol. 39. No. 23-24. pp. 674-680. With 2 figures.

The author considers that:

Leishmania, Ross 1903, should be united with *Herpetomonas;*

Leptomonas, Kent 1880, is synonymous with *Herpetomonas;*

Cercoplasma, Roubaud, 1911, is synonymous with *Herpetomonas;*

Endotrypanum, Mesnil and Brimont, 1908, is insufficiently characterised, and is probably a *Trypanosoma;*

Schizotrypanum, Chagas, should be incorporated in the genus *Trypanosoma;*

Copromonas, Dobell, 1908, is synonymous with *Scytomonas*, Stein.;

Prowazekia, Hartmann and Chagas, is synonymous with *Bodo*, Ehbg.;

Trypanoplasma, Laveran and Mesnil, is synonymous with *Cryptobia*, Leidy.

Diagnoses of several genera are given.

H. B. F.

ALEXEIEFF (A.). **Sur la Revision du Genre** *Bodo* **Ehrbg. (Réponse à M. le Professeur M. Hartmann).**—*Arch. f. Protistenkunde.* 1912. Sept. 6. Vol. 26. No. 3. pp. 413-419. 1 text-figure.

The author discusses the synonymy of the genus *Bodo* (Ehrenberg) and *Prowazekia* (Hartmann and Chagas).

He points out that in a free living *Bodo* described by PROWAZEK in 1903 there is a kinetic nucleus present, though PROWAZEK termed it the "*Geisselsäckchen.*" According to STILES the type species of *Bodo* is probably *B. saltans.*

Alexeieff proposes the name *Prowazekella* (n.g.) *lacertae* for "*Bodo*" *lacertae.* He also discusses forms between *Bodo* and *Cryptobia* (*Trypanoplasma*), genera which possess kinetic nuclei.

The author gives some text figures of *Bodo caudatus.* For further details those interested should consult the original paper.

H. B. F.

UNCLASSED.

SINTON (J. A.). **Some Observations on the Morphology and Biology of** *Prowazekia urinaria* **(*Bodo urinarius*, Hassall).**—*Ann. Trop Med. and Parasit.* 1912. July 31. Vol. 6. No. 2. pp. 245-268. With 2 plates.

The author discusses the genera *Prowazekia* and *Bodo* and the separation and creation of the former genus from the latter. *Prowazekia* was founded by HARTMANN and CHAGAS in 1910 for Bodo-like flagellates possessing a kinetic nucleus—the genus *Bodo* not possessing such a structure.

The earliest reference to the occurrence of Bodo-like flagellates in the urine was that of HASSALL (1859), who found them in fifty samples of urine from a number of different patients. Hassall named the parasite *Bodo urinarius*, and gave a very good description of it. The parasite was again described or referred to by Salisbury (1868), Kunstler (1883), Blanchard (1885) and Braun (1895) under various names.

The flagellates were found by Sinton in March 1912 in the deposit, after centrifugation, of a 24-hour old specimen of urine from a Mexican sailor in the Royal Southern Hospital in Liverpool. The patient was suffering from malignant tertian malaria and had a history of an attack of blackwater fever a few days prior to admission. The flagellate was subsequently seen in the deposit of a six-hour old specimen of urine from the same patient. The reactions of the urine were alkaline and neutral respectively. Neither of the specimens was taken with aseptic precautions.

When specimens of urine were taken with aseptic precautions the flagellates were not seen, and it was found that a temperature of 37° C. rapidly killed the cultures. The author consequently inclines to the view that the flagellate was probably not an inhabitant of the urinary tract but was an accidental contamination. The author used the method of Sellards (1911) for the isolation of pure cultures.

The morphology of the different forms is described and figured in detail. In *Prowazekia urinaria* there are two flagella (anterior and lateral) and two nuclei. The lateral flagellum is free, but lies along the body on the "flagellar side." In cultures three types of the parasite were found. All three were found to develop in a hanging-drop culture from a single flagellate. Morphological details are given.

The movements of progression, methods of multiplication, and the movements occurring during division are described in detail. The differences between division rosettes (in which the anterior flagella point outwards) and aggregation rosettes (in which the flagella may point in any direction, while the parasites are merely entangled) are described and illustrated. The processes of encystment and emergence of the flagellate therefrom were studied. The optimum temperature for growth of the parasites is 20° C., but growth occurs up to 30° C.

The paper is well illustrated by two coloured plates and twenty-two text-figures.

H. B. F.

Carini (A.). **Sur un Nouvel Hématozoaire du Pigeon.**—*Compt. Rend. Soc. Biol.* 1912. Oct. 25. Vol. 73. No. 29. pp. 396-398.

While examining the blood of a pigeon which had died from an experimental infection of canine *Toxoplasma*, the author found numerous parasites in the red blood cells which he considers to be new. The red blood corpuscles were neither decolourised nor hypertrophied by the parasite, though when the latter was large the nucleus of the host cell might be displaced towards the edge.

According to its stage of development the Haemosporidian, which contains pigment granules, exhibits the following forms:—small rounded forms; intermediate, round or oval forms; halter-shaped forms: forms with pseudopodia.

The parasites with pseudopodia are very characteristic and according to Carini separate the parasite from *Haemoproteus*. Halter-shaped forms are rare and sexual differentiation is not so clear as in *Halteridium*. Multiplicative forms have not been found in smears of the spleen, liver, kidney and bone-marrow, though numerous *Toxoplasma* exhibiting binary and multiple fissions were seen in the same preparations. Up to the present, the parasite has only been seen in one pigeon.

Carini proposes for this new pigmented avian haematozoön the name *Plasmodium columbae*, though he adopts the generic name with some reserve.

The paper is illustrated by five text-figures.

H. B. F.

PATTON (W. S.). *Spirochaeta ctenocephali*, **sp. nov., parasitic in the Alimentary Tract of the Indian Dog Flea,** *Ctenocephalus felis*. —*Ann. Trop. Med. and Parasit.* 1912. Oct. 18. Vol. 6. No. 3. B. pp. 357-359.

A new spirochaete has been found by the author in two larvae and one adult of *Ctenocephalus felis*. The larvae were bred from fleas living on two cats in the laboratory at Madras, while the adult fleas was taken from a dog in Madras.

The spirochaete is rare, for 1,500 larvae and 500 adult fleas were dissected, and the percentage of infection was only 0·15. The parasite was examined both fresh and stained. Transverse division was seen, and longitudinal division was strongly suspected. Long forms of the spirochaete measured 20 μ and short forms 4 to 6 μ in length. *Spirochaeta ctenocephali*, as the author names it, is a natural parasite of the gut of *Ctenocephalus felis*, the larva of which lives on the excreta of the adult.

H. B. F.

PATELLA (Vincenzo). **Sulla Natura Protozoaria dei Corpi di Kurloff.** [On the Protozoal Nature of Kurloff's Bodies.]—*Riforma Medica.* 1912. June 22. Vol. 28. No. 25. pp. 675-676.

The author believes that the Kurloff bodies are organic and belong to the Protozoa. He states that FOA first suspected the parasitic nature of these bodies and that he himself in 1907 first demonstrated it. He summarises the views of FERRATA, CESARIS-DEMEL, SCHILLING, PAPPENHEIM, LANFRANCHI and E. H. ROSS. He agrees with the conclusions of E. H. ROSS.

H. B. F.

BERIBERI.

LABORATORY AND EXPERIMENTAL.

FUNK (Casimir). **The Etiology of the Deficiency Diseases.**—*Jl. of State Med.* 1912. June. Vol. 20. No. 6. pp. 341-366.

In this important paper the author groups together several conditions termed deficiency diseases. These are beriberi, polyneuritis of birds, epidemic dropsy, scurvy, experimental scurvy in animals, infantile scurvy, ship beriberi, and pellagra. Diseases which were formerly considered either as intoxications by food or as infectious have now, after twenty years of experimental work, been shown to be caused by a deficiency in some essential substance in the food.

All these diseases present general characters—(1) Cachexia, with enormous loss of weight, and (2) marked nervous symptoms, generally of the nature of peripheral neuritis. Funk states that all (except pellagra) can be prevented and cured by the addition of certain preventive substances, the deficiency substances, which are of the nature of organic bases, and called by him vitamines. He divides these diseases into two groups, the beriberi and the scurvy groups.

The beriberi group includes beriberi, polyneuritis in birds, and epidemic dropsy. The results of the early experiments of BRADDON, FRASER and STANTON, EIJKMAN, and SCHAUMANN are given. During the last two years there have been many papers dealing with the isolation of the protective substances from food stuffs, rice polishings, katjang-idjoe beans, yeast, etc. The author thus summarises the knowledge, up to 1911, of the chemical nature of the protective substance in rice polishings: (1) The substance is soluble in water, alcohol, and acidulated alcohol, and is dialysable; (2) it is destroyed by heating to 130° C. and is not a salt or protein. He set to work to find what the active principle of this substance really was; after many experiments he showed that it contained neither phosphorus, proteins nor carbohydrates, and that it was of a basic nature. Finally a crystalline substance was obtained which had active curative powers. This he calls beriberi vitamine ($C_{17}H_2N_2O_7$).

SCHAUMANN's idea was that the curative agent acts only as an "activator" and that besides this a substance of a phosphatide nature is necessary. The author states that this can only be proved by further experiments, and proposes to feed birds on polished rice with the addition of vitamine. He states that a curative vitamine can also be extracted by alcohol from milk, ox brain, and lime juice.

Dealing with beriberi he writes: "Judging from the manifest nervous symptoms, the fatty degeneration in the nerve cells, and the chemical changes, I am inclined to think that vitamine is necessary for the metabolism of the nervous tissue." The lack of vitamine forces the animal to get this substance from its own tissues, the result being an enormous loss of weight, after which the available stock begins to be scarce. There is a consequent breaking down of the nervous tissues, with the result that nervous symptoms, such as are seen in beriberi, manifest themselves.

He classes ship beriberi with the scurvy group, but all forms are intimately connected. Different food stuffs which are known to prevent beriberi and polyneuritis, such as yeast, oats and barley (unhusked), are unable to prevent scurvy. On the other hand grains develop the scurvy vitamine during germination, and this suggests that scurvy vitamine can be formed by enzyme action from beriberi vitamine. The anti-scorbutic substance must be supplied as such by plants. In ships the food gets poor in scurvy vitamine more quickly than in beriberi vitamine, the result being an outbreak of scurvy or ship beriberi. Finally, milk provides all the constituents necessary for the growing organism and must contain all kinds of vitamines; but these are very unstable, being easily destroyed by heat.

P. W. Bassett-Smith.

SCHAUMANN (H.). **Über die Darstellung und Wirkungsweise einer der in der Reiskleie enthaltenen, gegen experimentelle Polyneuritis wirksamen Substanzen. Vorläufige Mitteilung.** [The Production and Mode of Action of a Substance contained in Rice-Bran, effective in Experimental Polyneuritis. (Preliminary Report.)]—*Arch. f. Schiffs- u. Trop. Hyg.* 1912. June. Vol. 16. No. 11. pp. 349-361.

Schaumann describes very fully his further experiments relating to the appearance, production, and properties of the very active substance found in rice-bran, which he calls the activator. He isolated this active principle in small quantities by methods similar in many ways to those employed by FUNK, and obtained much the same result with it. He found that the crystalline body, which produces such a marked effect upon the paralysis of pigeons suffering from experimental polyneuritis, was active when given by the digestive tract, as well as by injection. His work also showed that with this (in a certain sense) curative substance is found another very poisonous ingredient, probably choline, and that there is not more than 0·5 gram of the active curative substance in a kilo of rice-bran; FUNK estimates it at double that amount, but probably the proportion is not constant. The author goes on to point out that the end product, the nitrogenous base, cannot be looked upon as the only curative substance, the beneficial effect being produced by the collective effect of several substances; that is to say, the pure base can only play an indirect or mediate rôle. To support this view, he shows that in the case of a bird affected with this disease the administration of the pure base may remove the paralytic symptoms, but the bird continues to get weaker and thinner. On the other hand if the extract of the bran be given, even if the bird is fed on polished rice only, it will recover from the paralysis and gain weight. He considers that the minute dose of the extract or pure base that is found effective cannot be looked upon as an actual supply of food stuff, and shows that in cases so treated nerve degenerations are often marked, and that the degree of paralysis gives no measure of the amount of nerve degeneration. The very rapid recovery from paralysis, which occurs a few hours after the active substance has been given, shows that the paralysis cannot be due to structural pathological changes in the nerves. For the present he thinks we must accept the view that we have to deal with a body possessing a ferment-like reaction, acting as a catalyser.

The author intends to make further researches on the presence and effect of phosphates in the extracts. The active crystalline basic substance is found only in the pericarp of the rice grain together with the greater part of the phosphorus; it is possible that the activator may be of the utmost physiological importance for utilising this large amount of phosphorus in the normal germination of the grain. According to the researches of STÂNEK, betain, a nitrogenous base derived from trimethylamin, is directly accumulated in the vegetative organs which are physiologically most active; from this he concludes that this substance is not a waste substance, but is of importance in the metabolism of the plant tissue. The nitrogenous base isolated from rice bran is to all appearance similar to betain; there exist moreover between the metabolism of nitrogen and phosphorus most intimate relations.

P. W. B.-S.

EDIE (E. S.), EVANS (W. H.), MOORE (B.), SIMPSON (G. C.), & WEBSTER (A.). **The Anti-Neuritic Bases of Vegetable Origin in Relationship to Beri-Beri, with a Method of Isolation of Torulin, the Anti-Neuritic Base of Yeast**—*Ann. Trop. Med. and Parasit.* 1912. July 31. Vol. 6. No. 2. pp. 235-243.

The authors give a summary of some of the numerous papers which have been published since 1910, when they last wrote. SCHAUMANN had already suggested that other diseases might have a similar etiology to beriberi. FRASER and STANTON demonstrated that the active antineuritic substance of rice meal is soluble in water and alcohol; is stable in acid, but unstable in alkaline solutions; is thermolabile, is not a phytin or fat, and probably not a protein nor containing phosphorus; but that the phosphorus content of rice was an indicator of its safety as an article of food, which should contain at least 0·4 per cent. of P_2O_5. EIJKMAN had in 1897 demonstrated that beriberi could be prevented and cured by the use of hand milled rice. He isolated the active substances and strongly opposes SCHAUMANN's theory (1910) that the active principle is a phosphorus-containing compound. SHIGA and KUSAMA confirmed much of FRASER, STANTON, and EIJKMAN's work, disproving the bacterial and toxic theories. KILBOURNE showed the importance of the potassium content of rice meal. CHAMBERLAIN and VEDDER showed that the active curative substance from rice meal was able to dialyse through parchment. A daily dose of these extracts, containing 0·16 mgm. of P_2O_5 and 4·06 mgm. of nitrogen, cured fowls that were severely lamed, in a few days. FUNK has isolated from rice meal a crystalline nitrate of an organic base, which is extremely active in reviving pigeons that have contracted neuritis from feeding on polished rice. The formula he gives for this substance is $C_{17}H_{19}O_4N\ (HNO_3)$ (*v. supra*).

The authors found that when rice meal is heated to 120° C. (denaturisation) nearly twice as much of its phosphorus goes into solution in water as is the case with unheated rice; and of this soluble phosphorus only two-thirds dialyses, whereas five-sixths of the soluble phosphorus of unheated rice is able to do so.

They found, moreover, that after dried yeast was heated to 120° C. more than twice as much of the phosphorus appeared as phosphatide phosphorus than did before being heated. Alcoholic extracts of rice meal were found to be active in protecting birds from the onset of neuritis and in curing them, but concentrating the extracts on a water bath rendered these inactive. FUNK's method of extraction was tried on the original extract of the meal. In spite of continued treatment with the extract, the birds died in a few days. An attempt to extract the active substance from Katjang beans proved unsuccessful.

They next investigated the anti-neuritic powers of extracts of yeast. The method adopted for the isolation of the active principle is given in detail. Doses from ·003 to ·006 gm. gave most favourable results with experimental birds. The formula of the crystalline product they give as $N(CH_3)_3\ C_4H_7O_2\ (HNO_3)$ and for this they propose the name of "Torulin," the active principle of the yeast.

P. W. B.-S.

SHIGA (K.). **Experimentalle Studien über die Kakke (=Beriberi).** (2. Mitteilung). [Experimental Studies of Beriberi.]—*Centralbl. f. Bakt.* 1. Abt. Referate. 1912. Aug. 22. Vol. 54. Beilage. pp. 156*-170*.

The author, with KUSAMA, reported last year as the result of their investigations that the paralysis experimentally produced in animals was identical with, or very nearly related to beriberi in man; and that both were caused through the deficiency of certain substances in the food. In hens and pigeons atrophy, anasarca, and degeneration of the nerves were demonstrated, and in two apes hypertrophy and dilation of the heart were observed, a condition similar to that found in man. According to their experiments the deficiency substance in the food had nothing to do with phosphorus combinations.

Shiga accepts NOCHT'S and SCHAUMANN'S views that beriberi is caused by a partial underfeeding, but he believes that a want of balance between the food supply and the work done may bring about the same result (*e.g.*, as in the physiological strain of pregnancy, during which the disease often appears); and that individual predisposition, sex, age, and the time of the year play an important part. His experiments showed that the motor paralysis of pigeons fed on polished rice appeared in three or four weeks, that death followed in two or three days, and that pigeons which did not show any paralysis died later from inanition. In his experiments with fowls paralytic symptoms, associated with a great loss of weight, came on in eight weeks. From further observations on these birds, which he fed intermittently with polished and unpolished rice, and treated with injections of "pericarpin" (bran extract), he concluded that the general atrophy was in no way connected with the paralysis, nor necessarily preceded it. When the alcoholic extract was given at the first appearance of paralysis, this sign would rapidly pass off, as if the nerves had regained their normal (tonic) condition from a simple atonic state; but if the paralysis had reached a high grade and histological changes had probably taken place, repeated injections would be required for a cure. His experiments also showed that after injections of the alcoholic extract, although the paralysis quickly disappeared, recovery of the lost weight did not follow, and that paralysis was frequently present when the muscles were in good condition. The extract administered by the mouth did not act so rapidly as when given by injection.

The author found that nucleic acid and lecithin had no curative effect on the paralysis, and that alcoholic extracts of green Manchurian beans were more effective than those made from red beans (*Phaseolus radiatus*); barley mixed with rice had a preventive action. The following conclusions are given:—

1. Beriberi appears where there is a deficiency of a certain substance in the food, and may be indirectly brought about by all conditions which produce a loss of nutrition.

2. Individual predisposition plays a very important role.

3. The preventive substance in rice-brain is soluble in alcohol, and can be separated from the other ingredients, which have no curative value.

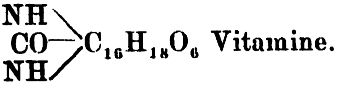
3. The paralysis in fowls has no direct relationship in time or amount to the atrophy.

5. Pigeons fed on equal parts of polished rice and barley were not affected; if the quantity of barley was reduced, paralysis generally appeared.

P. W. B.-S.

FUNK (Casimir). i. **The Preparation from Yeast and certain Foodstuffs of the Substance the Deficiency of which in Diet occasions Polyneuritis in Birds.**—*Jl. of Physiol.* 1912. Aug. Vol. 45. Nos. 1-2. pp. 75-81. ii. **The Substance from Yeast and certain Foodstuffs which prevents Polyneuritis (Beri-Beri).**—*Brit. Med. Jl.* 1912. Sept. 28. p. 787.

The author, in continuation of his previous work, gives further details relating to the preparation of the curative substance which he terms vitamine, minute quantities of which are essential in the diet of birds, man, and some animals. Working with yeast he obtained after much trouble a small quantity of the pure substance. Many cures were effected in pigeons with doses of 0·02-0·04 grm., and he considers it to be the sole curative agent. He corrects a previous statement that this substance was isolated in the form of a nitrate; it must be regarded as a base, probably belonging to the pyramidine group, and has the following formula—



$$\left.\begin{matrix}\mathrm{NH}\\ \mathrm{CO}-\\ \mathrm{NH}\end{matrix}\right> \mathrm{C_{16}H_{18}O_6}\ \text{Vitamine.}$$

From 51 kg. of rice polishings a substance named allantoin was isolated; it was entirely different from the curative substance, but seemed to prolong the lives of seven pigeons suffering from polyneuritis.

The chemical properties of the curative substance suggest that it forms a constituent of a nucleic acid.

P. W. B.-S.

CLINICAL AND EPIDEMIOLOGICAL.

ANDREWS (V. L.). **Infantile Beriberi.**—*Philippine Jl. of Science,* Sec. B. [*Philippine Jl. of Trop. Med.*] 1912. April. Vol. 7. No. 2. pp. 67-89. With 3 plates.

The author states that, though there has been so much written about beriberi in adults, it is only in Japan and the Philippines that it has been noticed in infants. HIROTA from clinical observations (1888-1897) concluded that there was an infantile form of the disease, and this was recognised in the Philippines under the name of "taon." Deaths from this disease were so frequently reported that the Health Bureau in 1909 took steps to confirm the diagnosis. In 1910 the post-mortem reports of children under one year showed evidence of infantile beriberi in 56 per cent. Clinically the children, usually about two months old, suffered from oedema, dyspepsia, and cyanosis, but often, when apparently well, a child would be seized with a fit of crying, evidently on account of great pain, and in a few hours would be dead.

Further observations showed that all the children affected were breast fed, that the mother had nearly always symptoms of beriberi, and that her diet was frequently defective. The milk was very poor, but occasionally it contained a normal amount of fats and carbo-hydrates, with an excess of calcium oxide. The phosphorus pentoxide in one instance was double the normal; the disease therefore was not due to want of phosphorus.

Necropsies were obtained in eighteen cases, eight of these having been seen during life. The macroscopic findings completely agreed with those of 1910. A description of these is given. As regards the microscopic appearances of the most important organs and tissues—the heart and nerves—the author writes as follows:—

"*Heart.*—The muscle fibers of the right heart are hypertrophied and the muscle nuclei are apparently increased in number. In nearly all cases the cross striations are distinct without any appearance of degeneration. In a few cases there is a slight clouding of some of the fibers. The fibers of the left heart are of normal size, cross striations are distinct and no clouding of fibers is present. Congestion is present.

"*Nerves.*—Sections from various nerves (vagi, phrenic, intercostal, and anterior tibial) were taken for staining. These were stained by MARCHI's method and show degeneration of some of the fibers. The degeneration is not as extensive as is found in cases of adult beriberi but is clearly defined."

In infants sick of beriberi the author noted that improvement rapidly followed a change in diet, so he was led to the conclusion that the milk of the mother must bear some casual relation to the condition. Probably this is deleterious by reason of what it lacks rather than because of any harmful constituent. If this were true, then it would seem probable that the condition could be reproduced in laboratory animals, such as young puppies, by feeding them with the mother's milk. The author, therefore, obtained sixteen puppies and got the mothers of the beriberic infants to nurse them. For various reasons several died, only seven being nursed for a period of one month or longer. All of these showed inco-ordination and weakness of the extremities, particularly of the hind legs.

At autopsy, oedema and anaemia of the subcutaneous tissues were present, and slight degeneration of the peripheral nerves was demonstrated by Marchi's method. According to the author, these findings agree entirely with the lesions obtained in infants dying of beriberi, but only one puppy showed dilatation and hypertrophy of the right heart, a feature constantly found in the human disease.

The author's conclusions are as follows:—

"1. The high infant mortality in Manila is due to infantile beriberi.

"2. This high death rate of infants is due primarily to the quality of the mother's milk.

"3. The mother's milk lacks something which is essential for the growth and development of the nerves of the child.

"4. The disease is not due to an infection or toxaemia of either the mother or the child.

"5. Another link has been added in the chain of evidence showing that beriberi is a nutritional disturbance.

"6. As a prophylactic measure, the dealers handling rice should be required to keep on hand the undermilled variety, and a campaign of education should be carried on for the purpose of enlightening the poorer classes, especially the pregnant women."

P. W. B.-S.

Thomson (D.) & Simpson (G. C.). **Treatment of Beri-Beri.**—*Ann. Trop. Med. and Parasit.* 1912. May 29. Vol. 6. No. 1. B. pp. 53-54.

In this paper are described the results of treatment employed in the Royal Southern Hospital, Liverpool, on three Lascar firemen suffering from beriberi. During a voyage of five weeks their food consisted mostly of fish and rice, the former being bad, and the latter of the polished variety. The symptoms set in a week before admittance.

Case 1, aged 60, had well-marked mixed beriberi. The patient was placed on a full diet, with one ounce of yeast daily and katjangido beans (200 grammes). In a week the symptoms had almost cleared up and on the 16th day he was discharged with normal reflexes, walking perfectly well. Case 2, an early one without oedema, received the same treatment; improvement was marked on the sixth day and in sixteen days he was discharged. Case 3 was more severe. There was wasting, slight fever, oedema, pain, spastic gait, and increased reflexes. Similar treatment was adopted, and again in six days there was marked improvement. On the sixteenth day he was discharged apparently quite recovered.

The authors note that the improvement in these cases was very rapid. This would seem to show the marked curative power of the addition to the diet of katjangido beans and yeast.

P. W. B.-S.

Manaud (A.). **Une Observation de Contagion du Béribéri.**—*Bull. Soc. Path. Exot.* 1912. July. Vol. 5. No. 7. pp. 514-518.

The author describes a small epidemic of beriberi in 1911-1912 in the Siamese prison of Tachim. On the fifth of August, 1911, a prisoner suffering from beriberi was brought from an infected prison at Petchaburi to Tachim; on the third of October the first case was noticed there. There were in all 37 cases out of a total of 110 prisoners, with 6 deaths. The cases were mostly of the dry form. The rice used was the polished white variety from Bangkok. From March 9th, 1912, only hand milled rice was allowed, and there were no fresh cases. Manaud states that white rice had been used in the prison for years, but there had been no outbreak of beriberi until after the importation of a case; undoubtedly however the suppression of the epidemic was due to the discontinuance of the white rice. He concludes that the causal agent of beriberi, when brought into a locality and acquired by persons there, is able to exist in a latent state. A simple saprophyte in the normal alimentary canal of man, it becomes pathogenic when he subsists exclusively on white rice. Feeding on white rice alone is not sufficient to produce beriberi unless the individual already harbours the germ. He explains the pathogenic rôle of white rice in two ways.—(1) It produces a special state of inanition through " deficiency." (2) The starch becomes in the intestine a favourable medium for the development of the germ and for the production of its toxin.

[Up to the present no definite germ or toxin has ever been demonstrated in beriberi, and the occurrence of the first case at Tachim three months after the arrival of the infected man was probably fortuitous.]

P. W. B.-S.

Browning (H. G.). **Etiology of Beri-Beri.** [Memoranda.]—*Brit. Med. Jl.* 1912. July 13. p. 69.

The author briefly points out that food apparently played only a small part in the causation of an outbreak of beriberi in a ship to which he was attached. There was a native crew of Calcutta Indians, consisting of 29 deck, and 52 engine room hands. All had exactly the same food, flour, rice-meal, and vegetables, and there were no complaints as to its quality. The deck crew slept in a dry compartment forward; the engine room hands below, where it was often very damp. Among the engine room hands, there were six cases of beriberi and nine suspected cases; the deck hands were quite free.

[There is no doubt that in ships the hard work, and the conditions under which the engine room hands live, predispose to the development of any debilitating disease, notably beriberi.]

P. W. B.-S.

Surveyor (N. B.). **Notes on the Treatment of Beri Beri.**—*Trans. Soc. Trop. Med. and Hyg.* 1912. July. Vol. 5. No. 8. p. 364.

Surveyor gives a short description of a severe case of beriberi, treated in the " J. J. Hospital " at Bombay by an alcoholic extract of rice waste dissolved in glycerine, called locally "Konda"; calcium glycero-phosphate was also given. There was marked improvement after the third injection of the extract.

P. W. B.-S.

LAWS (C. E.). **Beriberi among the Filipinos.** [Correspondence.] —*Jl. Amer. Med. Assoc.* 1912. Aug. Vol. 59. No. 6. p. 463.

This letter describes the author's experiences while practising for some years in the Philippines, before white rice had been demonstrated to be the important factor in the etiology of beriberi. He notes that the very poor were least affected, for they cleaned their rice in a crude fashion and did not destroy all the pericarp, while the rich always had fine white rice. The steps then taken to eradicate the disease were segregation, and dietary and medicinal treatment. It was impossible to exclude rice altogether, but native cleaned rice was substituted for white rice, and beans and native peas (*Phaseolus mungo*) were added, the latter acting almost as a specific in certain cases.

P. W. B.-S.

SHIGA (K.). **Ein epidemieartiger Kakke- (Beriberi-) Ausbruch in einem Gefängnis in Korea. (Ein Beitrag zur Entstehung der Kakke.)** [An Epidemic of Beriberi in a Prison in Korea.]—*Arch. f. Schiffs. u. Trop. Hyg.* 1912. Aug. Vol. 16. No. 15. pp. 522-526.

The author gives a description of an epidemic of beriberi which was discovered in a prison in Korea. It began in May, 1911, and ended on June the 19th. The number of cases was 97, or 35 per cent. of the inmates, and all were Japanese. On investigation, the hygienic conditions of the prison were found very nearly perfect. There was no beriberi in the town, so that infection could not have been brought from without. Sporadic cases had occurred in the prison previously (7 in 1910). Five men, who had suffered in the previous year, were still present when the epidemic broke out, and might have been "carriers" of the hypothetical excitant of the disease; but this was unlikely as females, with whom these men never mixed, were affected also.

The staple food was four parts of polished rice and six parts of barley. Previously, when rise only was given, beriberi had been very common, but all agreed that with the new dietary it had greatly diminished. The prisoners received food in accordance with work done, and most beriberi cases occurred in those who had the lowest grade of diet. The author gives tables of weights, diet, and work which show that those prisoners who had been losing weight before the epidemic were mostly affected, and it was noticed that these showed early gastro-intestinal disturbances. 48 per cent. of the cases were in the non-workers who never moved about; this circumstance, with the mental discomfort and the bad air in the cells, must have favoured nutritional disturbances.

The author draws the following conclusions:—The study of the epidemic does not supply a single fact in support of beriberi being an infectious disease, but furnishes various factors favourable to the defective nutrition view (confinement in cells, want of open-air exercise, etc.). It is questionable whether there is any form of beriberi attributable to an infectious agent; probably, as NOCHT has shown, the so-called "infection" in any instance will not stand a careful enquiry.

P. W. B.-S.

GOUZIEN (Paul). **Le Béribéri au Tonkin.**—*Ann. d'Hyg. et Méd. Colon.* 1912. July-Sept. Vol. 15. No. 3. pp. 445-491.

The author describes, in a long paper, an epidemic of beriberi which occurred in the Civil prison at Hanoi. He gives fully the main centres of the disease in Tonkin, and finally discusses the etiology of the disease and prophylactic measures. In Hanoi the prison is a comparatively new one, but it is badly placed in the centre of the town and is very damp. The disease chiefly affected the men soon after being admitted to the prison, and especially those who had the least liberty. The onset was generally sudden. The epidemic ceased abruptly when white rice was replaced by hand milled rice, together with a varied fresh diet and improved sanitation. Six weeks afterwards symptoms of scurvy appeared in 64 cases, exclusively in those who had previously suffered from beriberi, and apparently due to their returning to the old diet. The second outbreak also quickly disappeared when the cause was removed.

The beriberi centres in Tonkin were scattered on the low ground throughout the delta, the disease affecting the inmates of schools, prisons and barracks. It was always most prevalent in the wet season, attacking mostly the young robust newcomer. The author considers that excessive humidity plays a double role: (1) It acts on the rice grain, depriving hand milled rice of its protective properties and rendering it toxic; (2) It causes a diminution in the resisting powers of the patient. When rice is kept in damp store houses it very rapidly spoils, and its use is followed by an outbreak of the disease, especially when the dietary is deficient in fresh food.

The author compares beriberi with haemoglobinuric fever: in the latter the soil is prepared by previous attacks of malaria, the onset being provoked by cold, etc.; in the former the soil is prepared by a defective diet, the beriberi syndrome being produced by different effective causes, isolated or associated, as humidity, over-crowding, insufficient food, mental conditions, or the ingestion of large doses of the neurotoxic substances, the disease being able to exist in a latent state for some time. From his observations in Tonkin he believes that beriberi is an intoxication, not an infection, a toxin formed in the food being absorbed with it. He draws attention to the frequency with which scorbutic symptoms alternate with those of beriberi, or are evolved side by side with them. The author also discusses the possibility of the disease being due to an anaphylactic action of a toxic food, and whether the incompletely decorticised rice exerts an antitoxic effect.

The prophylactic measures recommended are dietetic and hygienic, and isolation of the cases.

[The close relationship of beriberi and scurvy in this district is of considerable importance, as is also the marked loss of protective power of the non-polished rice from the excessive humidity; but there is no definite proof of any toxin formation in the grain nor of intoxication in the patient, the observations being compatible with the view that the disease is caused by a deficient dietary with which certain predisposing factors are associated.]

P. W. B.-S.

FARGIER. **Béribéri et Riz fraîchement décortiqué.** *Ann. d'Hyg. et Méd. Colon.* 1912. July-Sept. Vol. 15. No. 3. pp. 491-497.

The author gives a short account of an epidemic of beriberi which occurred among Annamite troops near Saigon. It steadily increased from 1907 to 1910. In 1909 there were 174 cases with 16 deaths. In June of 1910 there was a local enquiry and great changes in the food supply were made. Red rice was substituted for white, and fresh fish with vegetables for dry fish. The epidemic ceased at once.

P. W. B.-S.

SHIBAYAMA (G.). **Bericht über die Beriberiepidemie bei den Auswanderern auf dem Dampfer "Kaspelas."** [An Epidemic of Beriberi among Emigrants on the Steam Ship "Kaspelas"]—*Arch. f. Schiffs- u. Trop. Hyg.* 1912. Nov. Vol. 16. No. 21. pp. 721-731.

The steam ship "Kaspelas" left Yokahama with 664 emigrants on September 26th, 1908, arriving at Callao, Peru, on November 10th. Of these, 62 returned to Japan, arriving there on February 11th after a very bad passage of 139 days.

The first case of beriberi was found on December 21st. The numbers increased until all were affected. Five died on the passage, and one at Yokahama. The author found 25 patients in hospital and 10 others slightly ill; the remainder could not be traced. The hygienic condition of the ship and the water supply were moderately good. The rations consisted mostly of rice, but a moderate amount of condiments, fresh meat, and fish were given from time to time. Full tables of the dietary from December to February are given. There were, however, many complaints about the food, though this appeared sufficient. On the way out Japanese rice was used and there was one doubtful case of beriberi which recovered. On the way home Peru rice was supplied, but this it is stated could not have been the cause of the epidemic, as 6 Japanese employed in the kitchen and 38 Chinese sailors and stokers, who used it, were unaffected. [The preparation of the food and living conditions of these were probably different from those of the emigrants.]

Full descriptions of three cases are given. These were of the ordinary wet form. The author, after discussing the various factors, comes to the conclusion that deficiency in the diet was not alone sufficient to cause the epidemic, for with an increase in the dietary the beriberi continued. In his opinion the disease in East Asia comes on after deterioration of health by exhausting conditions, and bears some relationship to locality, requiring some unknown active agent as the exciting cause.

P. W. B.-S.

PREVENTION.

FRASER (H.) & STANTON (A. T.). **The Prevention of Cure of Beri-Beri.**—*Lancet.* 1912. Oct. 12. pp. 1005-1007.

The authors take it as proved that beriberi and polyneuritis in birds are due to the deficiency of a substance in food, and that rice is rendered harmful by the milling and polishing process which deprives it of some essential property.

Harmful and harmless rice can readily be distinguished by inspection, but it is very desirable that there should be some chemical method of standardisation by which a sample can be tested as to its fitness for food. The estimation of the phosphorus pentoxide they consider is the most satisfactory test; the presence of 0·4 per cent. can be used as a safe, practical, and fair indicator. The estimation of fats and proteids, which are also contained in the sub-pericarpal layers, is more difficult and less reliable. They consider that any hasty legislation or taxation of the polished rice would probably defeat its object, but the gradual education of the people to the advantages to be derived from the use of unpolished rice is most necessary; even now some Chinese employers are taking an active interest in doing this. In 1911 there were admitted into the Government hospitals of the Federated Malay States no less than 5,340 cases of beriberi; prophylactic and curative measures are therefore urgently needed. The authors, believing in the similarity of the two diseases, carried out a number of experiments on fowls fed on polished rice, to test the prophylactic and curative powers of extracts which they prepared from rice polishings. The results were most satisfactory. Two drams of the effective liquid extract represented two ounces of fat-free polishings, the daily dose for an adult beriberi case. In old cases long treatment would be required. With favourable conditions the addition of the extract to the food of the patient will materially hasten his recovery.

P. W. B.-S.

SCHÜFFNER (W.) & KUENEN (W. A.). **Über den Einfluss der Behandlung des Reises auf die Beriberi und die daraus entstehenden Fehlerquellen bei der Beobachtung.** [Influence of the Treatment of Rice in the Causation of Beriberi and the Sources of Error that thus arise.]—*Beihefte. zum Arch. f. Schiffs- u. Trop. Hyg.* 1912. Oct. Vol. 16. Beiheft 7. pp. 5-30. [575-600.]

The authors state that though the rice theory gains ground steadily certain people do not accept it, because in a given population eating the same rice as a staple food some are affected while others remain free. They give an instructive case bearing on this point: a worker in a hospital was alone attacked with beriberi, though supplied with the same rice as all the others; it was found that before use he submitted it to fresh pounding, removing the remainder of the outer covering of the grain with its protective properties. The authors have studied the manufacture of rice from the time of harvesting to that of its use as food. They state that it is very difficult to make coolies eat any other than polished rice. "Cured" or parboiled rice (BRADDON) keeps best, as the method preserves much of the cuticle; but all samples are not of uniform character, some being quite deficient in cuticle and having therefore a low P_2O_5 index. This indicates that some samples of so-called "cured" rice may nevertheless be dangerous. The fact that "cured" rice is sometimes associated with beriberi negatives the living infective agent theory held by some.

The authors then give their method of estimating the P_2O_5 in various samples of rice, which varies from ·9 per cent in cargo rice to ·01 per cent. Native prepared rice had ·65 to ·54 per cent., Rangoon or coolie rice as used at Deli ·42 to ·46 per cent. (very near FRASER's ·46 per cent limit). Siam and Java rice was much lower and dangerous. Rangoon rice often produces beriberi but not if the P_2O_5 is above ·46 per cent. It is not necessary to reach the high standard of village rice (·6 per cent.) to obtain absolute safety; 0·5 per cent. would be enough and would not affect the preserving qualities of the grain or be opposed by the people; this standard should be fixed by law.

Much washing reduces the protective power of rice, but "cured" rice loses less than others; steaming and boiling has the same effect, by destroying the cuticular layers. The authors state that the custom of drinking the rice washings practised by Malays, Javanese, and Chinese is advantageous, but in prisons this valuable material is thrown away; and so prisoners frequently suffer. KOHLBRUGGER's theory that washing the rice is likely to be beneficial is strongly criticised. The authors' view differs from that of FRASER and STANTON; they do not consider the 0·46 per cent. P_2O_5 standard of raw rice as the ultimate criterion whether or not beriberi will be produced, but that this depends on the subsequent treatment of the rice. An instance is given in illustration. At two prisons in Deli, one, Lubag Pakhan, was rarely, the other, Medan, commonly affected. On investigation it was found that at the latter the rice was steamed and thoroughly washed when half done, while in the former it was boiled in a large iron vessel with just sufficient water. The greater healthiness of the former, generally put down to situation, soil, etc., was really due to the better preparation of the rice.

The immunity among the Javanese is due to the fact that they have a more liberal diet; they eat the same rice as the Chinese, but take more fruit and vegetables. The newly arrived Chinese suffer most, being ignorant of the produce of the country. Many facts are brought forward to show that both the age of the rice and long storage is detrimental, and that the older the rice the whiter it can be pounded. The danger is not due to the presence of a poison, but to the absence of an essential part of the rice grain. The main facts are thus summed up—

(1) Beriberi is due to a deficiency of unknown substances utilised in the body as building material for the nervous system, or necessary for the maintenance of internal secretions.

(2) Rice eating nations should draw these substances from the silver cuticle of the rice, especially the aleurone layers.

(3) A criterion of the presence of the essential substances is the phosphorus content.

(4) Factory milled rice may be obtained with all degrees of P_2O_5 constituents, the highly polished rice causing beriberi if other food stuffs do not compensate.

(5) The final value of the rice depends not only on the amount of polishing, but on methods of washing, cooking, and storage. Purchasing the same kind of rice does not, therefore, mean eating the same kind.

For prevention, the author lays stress upon (1) Rice reform, with a minimum legal limit of 0·5 per cent. P_2O_5 for the dry substance; (2) If this is not imposed, substitution of other foods to make up the important deficient ingredient; (3) A strict control of all samples of so-called "cured" rice.

P. W. B.-S.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. I.] 1912. [No. 4.

DYSENTERY.

Amoebiasis and Amoebic Dysentery.

Vedder (E. B.). **An Experimental Study of the Action of Ipecacuanha on Amoebae.**—*Far Eastern Assoc. Trop. Med.*: *Trans. Second Biennial Congress held at Hongkong,* 1912. pp. 87-91.

Experiments were first made to ascertain if ipecacuanha had any bactericidal action on *B. dysenteriae.* Series of broth tubes were prepared, one containing two per cent. of fluid extract of ipecacuanha, the other two per cent. of the extracts or tinctures of such drugs as hydrastis, digitalis or opium, and in these various broths cultures were made of *B. dysenteriae, B. typhosus, B. paratyphosus* and *Staphylococcus aureus.* The results showed that *all* these drugs had an inhibitory action on *all* the bacteria, and further experiments proved that in broth containing one per cent. of fluid extract of ipecacuanha *B. dysenteriae* grew freely. The conclusion formed was that ipecacuanha had no specific effect on bacillary dysentery.

The next experiments were made with broth cultures of amoebae. As cultures of *Entamoeba histolytica* could not be obtained, amoebae were grown in one case from tap water and in the other from the stools of a healthy man. On adding fluid extract of ipecacuanha to these cultures in various dilutions it was found that 1 in 10,000 to 1 in 50,000 was sufficient to kill the amoebae. Four different extracts of ipecacuanha were used. Ipecacuanha *sine* emetina had no amoebacidal action.

Experiments were then made to ascertain what constituents of ipecacuanha were amoebacidal. Emetine salts killed the cultures of amoebae in dilutions of 1 in 100,000, cephaelin in the same dilutions, but on estimating the quantity of these substances in a given sample of ipecacuanha it was found that an extract from such a sample had a greater amoebacidal action than could be accounted for by the presence of these two alkaloids.

The physiological action of emetine and cephaelin was then examined, dogs being used as the experimental animals; it was found that 0·5 gram of emetine failed to produce vomiting or any other symptom, while 0·1 gram of cephaelin produced violent vomiting and depression.

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The author concludes this highly interesting and suggestive paper by stating that further experiments are in progress and that, if these show that emetine has no marked emetic and depressing action and a constantly high amoebacidal action, we have a drug which may prove as active against amoebic dysentery as quinine is against malaria.

S. R. Douglas.

LYONS (Randolph). **Observations on the Effect of Ipecac, Phenol, and Salicylic Acid on Amebae in Vitro.**—*New Orleans Med. & Surg. Jl.* 1912. June. Vol. 64. No. 12. pp. 881-887.

The author used amoebae from cultures. His summary of results and experiments is as follows:—

"1. The experiments with ipecac on amebae in vitro fail, thus far, to explain its clinical value in the treatment of amebic dysentery. In a few experiments ipecac apparently possessed slight inhibitive power on the amebae, but the results were not sufficiently marked to warrant any definite conclusion.

"2. It is possible that the action of the ipecac is dependent upon some specific change which it undergoes after ingestion into the body. On the other hand, it is highly probable that the amebae grown upon artificial media are not the *Entameba histolytica* and may therefore be more resistant to the action of the ipecac.

"3. The experiments with phenol show that it has no effect upon amebae except in comparatively strong solutions. Its action is chiefly upon the symbiotic bacteria. From a clinical point of view the action of phenol is unimportant.

"4. The experiments with salicylic acid revealed a marked destructive action upon amebae in dilutions up to 1-500. Above this point some slight inhibitive effect on their growth was demonstrated in dilutions as high as 1-10,000. It is also strongly bactericidal.

"5. This marked effect of salicylic acid on amebae is an additional reason for the administration of ipecac in salol-coated pills in preference to other coatings (*e.g.*, keratin) or methods, as it is well known that salol is broken up into its two constituents in the intestinal tract, yielding about 64 per cent. of salicylic acid.

"6. I would suggest also the use of salicylic acid as an irrigating fluid. in amebic dysentery, in watery solutions of 1-4,000 to 1-1,000 strength."

In a postscript the author notes that Dr. E. B. VEDDER finds "that ipecac is a powerful amebacide, and that this property is probably dependent upon its emetin content, which differs widely in various specimens."

H. B. Fantham.

ROGERS (Leonard). **The Rapid Cure of Amoebic Dysentery and Hepatitis by Hypodermic Injections of Soluble Salts of Emetine.** —*Brit. Med. Jl.* 1912. June 22. pp. 1424-1425.

Further Experience of the Specific Curative Action in Amoebic Disease of Hypodermic Injections of Soluble Salts of Emetine. —*Ibid.* Aug. 24. pp. 405-408.

The author commences with a short history of the use of ipecacuanha in amoebic dysentery and points out that VEDDER showed that dilute solutions of emetine killed cultures of amoebae (*v. supra*). Rogers states that *Entamoeba histolytica* in stools were immediately killed by 1:10,000 solutions of emetine hydrochloride and that solutions of 1:100,000 rendered the amoebae inactive and apparently killed them. [No details of these experiments are given.] He then gives the details of a series of cases of severe dysentery in which emetine hydrochloride or hydrobromide was administered hypodermically, with the result that all showed rapid improvement of the symptoms, diminution of the leucocytes, and disappearance of the amoebae from the stools. Cases of hepatitis also were treated with good results, and lastly cases of liver abscess were treated successfully by aspiration of the pus and injection into the abscess and under the skin of solutions of emetine hydrochloride. Either the hydrobromide or the hydrochloride may be used, the latter being the more soluble; the usual dose was one third to one half grain three times a day for two or three days, dissolved in sterile salt solution; the maximum dose was one grain. No depression or vomiting occurred after these doses. The solutions used for injecting into the cavities of liver abscesses were made by dissolving one grain of emetine hydrobromide in two ounces of water. The author concludes by stating that "this remarkable remedy—probably the most active specific in the whole range of medicine, not excluding quinine and salvarsan—has for long been thrown away by those who pinned their faith in ipecacuanha sine emetina."

S. R. D.

Lawson (J. Ward). **Treatment of Chronic Dysentery by Emetine Salts.** [Memoranda.]—*Brit. Med. Jl.* 1912. Sept. 28. pp. 793-794.

Notes of a case of chronic dysentery. The patient, aged forty, had contracted dysentery during the South African war, and had suffered from dysenteric symptoms ever since, having about ten motions daily.

Nine subcutaneous injections of emetine hydrochloride were given, commencing with one sixth gr., which was increased to one half gr., in all two and three quarter grs. [Length of treatment not given.] Immediate improvement followed and the patient has remained well since, *i.e.* for a period of two months. No vomiting or other discomfort followed the injections. No mention is made of the examination of the stools for amoebae.

S. R. D.

Rogers (Leonard). **Amoebic Colitis in India: Prevalence, Diagnosis, and Emetine Cure.**—*Lancet.* 1912. Oct. 19. pp. 1062-1067.

The author commences by discussing the relative frequency of amoebic and bacillary dysentery in India. From cases examined in the post-mortem room at the Calcutta Medical College he compiled the following table:—

Primary.		Complicating.		Total.
Amoebic	35	Liver abscess	43	80
		Other diseases	2	
Bacillary	27	Kala Azar	8	45
		Other diseases	10	

Investigations on patients in the hospital by the agglutination test and the microscopical examination of the stools gave 31 cases of amoebic dysentery and 14 others, in most of whom some evidence of their being affected by *B. dysenteriae* could be obtained. [No details of this evidence are given.]

With regard to the seasonal prevalence of dysentery, it was found, on examining the monthly admissions to the jails for the year 1906-1910, that the disease was much more prevalent during the rains than in the drier and colder periods. Several curves are given.

To show the prevalence of amoebic dysentery in various parts of India the author examined the ratio of dysentery cases to those of liver abscess amongst the British Army and found one case of liver abscess for every seven of dysentery.

For differential diagnosis the author relies on the microscopical examination of the stools with a one sixth inch objective. [Power of eye piece not mentioned.] In fifty consecutive amoebic cases examined:

42 per cent.	showed	"very numerous"	amoebae.
48 ,,	,,	"numerous"	,,
4 ,,	,,	"few"	,,
4 ,,	,,	"very few"	,,

In one fatal case, although amoebae were not found during life, appearances suggested that the case was one of amoebic colitis. In four of the above cases amoebae were found only on examination of a further sample of the stools.

When the parasites are few in number the author advises a method described by some French authors, which consists of adding a drop of one per cent. methylene blue solution to the mucus before putting on the cover slip; the pus and epithelial cells are rapidly stained while the amoebae remain as clear spaces and their movements are not impaired.

A table is given comparing the results obtained by the treatment of cases with ipecacuanha on the one hand and emetine on the other.

	Treated with Ipecacuanha.	Treated with Emetine.
Died from dysentery within three days of admission	4	2
Died from dysentery over three days after admission	7	—
Died from other diseases after cure of dysentery	—	2
Removed from hospital in very bad condition	2	—
Left hospital unchanged or not cured	4	—
Cured	13	20
Average days in hospital of cured cases	16·4	7·2
Average days before stools became normal	11·4	2·35
Average grains of ipecacuanha or emetine to that time	406	2·00

The author concludes his paper with an account of two special cases.

S. R. D.

WALSH (J. H. Tull). **Emetine Salts in the Treatment of Dysentery.** [Correspondence.]—*Lancet.* 1912. Oct. 26. p. 1179.

A short letter drawing the attention of Lt.-Col. Leonard ROGERS to a paper by the writer, which appeared in the *Indian Medical Gazette* (September, 1891), on the use of emetine in dysentery.*

S. R. D.

FOY (George). **Ipecacuanha and Emetine.** [Correspondence.]—*Lancet.* 1912. Nov. 2. p. 1242.

A letter giving some details of the history of the use of ipecacuanha in dysentery. Foy points out that in 1829 Dr. James Lomax BARDSLEY obtained excellent results in some forms of dysentery and chronic diarrhoea by the use of emetine.

S. R. D.

CRAIG (Charles F.). **The Parasitic Amebae of Man and their Relation to Disease.**—*New Orleans Med. & Surg. Jl.* 1912. July. Vol. 65. No. 1. pp. 1-17.

In this paper, read before the Louisiana State Medical Society, in April, 1912, the author gives a review of the subject. He considers that infection with parasitic amoebae should be known as "entamoebiasis," and that there are three well-defined species which are generally accepted as parasitic in man, namely, *Entamoeba coli, E. histolytica,* and *E. tetragena.* Their differentiation must be based on both morphology and life-history.

As regards cultivation, Craig considers that all cultivated amoebae are free-living species belonging to the genus *Amoeba,* and have nothing to do with the production of dysentery. He states:—

> "Though it is possible for the free-living species to pass through the intestinal canal of animals in an encysted state and afterwards develop in cultures, it should be remembered that unless the most careful cultural technic is used such amebae may contaminate the cultures from the atmosphere, and it is probable that this is the manner in which many cultures have been obtained, especially in regions where the free-living species are found abundantly."

Entamoeba nuttalli, a species parasitic in monkeys, described by CASTELLANI (1908), is of special importance because it produces dysentery in these animals, and has probably been mistaken for the pathogenic species of man in monkeys used for experimental purposes.

Craig considers that it is clearly established that *E. coli* is not a pathogenic organism, and that *E. histolytica* and *E. tetragena* are the species most frequently concerned in the etiology of amoebic dysentery. In conclusion he writes:—

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* Finding the results of the treatment of dysentery with ipecacuanha *sine* emetine unsatisfactory the author tried the effect of a compound of emetine with mercuric iodide. This compound was given as a powder diluted with white sugar, the average dose in 24 hours being about 1 grain of emetine. The results obtained are given in a table showing 22 cases with one death, and one case in which no improvement took place. The average duration of dysenteric stools in the remaining cases was 4·9 days. As a control to these cases a table of 10 cases, treated with various decoctions, is given in which the average duration of dysenteric stools worked out at 5·7 days.—WALSH (J. H. Tull). What is the Rational Treatment of Acute Dysentery?—*Indian Med. Gaz.* 1891. Sept. p. 269.

"Another practical deduction to be drawn from the work which has been done upon cultural amebae is that amebic dysentery is due to strictly parasitic species and that in order to avoid spreading the infection it is necessary that the feces of dysenteric patients be disinfected. This measure is very frequently neglected, and thus infection is spread by the encysted stages of the entamebae reaching food and water.

H. B. F.

DARLING (Samuel T.). **The Examination of Stools for Cysts of** *Entamoeba Tetragena.—Jl. Trop. Med. & Hyg.* 1912. Sept. 2. Vol. 15. No. 17. pp. 257-259.

In the author's opinion all the pathogenic entamoebae found in patients in Panama are *Entamoeba tetragena.* He believes that the cysts of these amoebae are frequently overlooked owing to faulty technique in staining; the best results were obtained by staining wet-fixed films with haematoxylin. Fresh preparations showed the cysts as round, homogeneous, refractile bodies 15μ in diameter. Kept in a moist chamber or under a cover slip sealed with vaseline, they were seen after one or two days to contain one, two, or four nuclei. Persons whose stools contained cysts were infective, this being proved by feeding experiments on half-grown cats which readily took the disease. Stools containing many fully developed amoebae were found to be much less infective and in these no cysts could be discovered by microscopical examination. The fatal and acute cases showed no cysts; these however were often numerous in chronic and very slight cases.

S. R. D.

PROWAZEK (S. v.). **Weiterer Beitrag zur Kenntnis der Entamöben.** [A Further Contribution to our Knowledge of Entamoebae.] —*Arch. f. Protistenkunde.* 1912. July 22. Vol. 26. No. 2. pp. 241-247. With 1 plate and 18 text-figures.

The author, when examining Protozoa from the South Sea Islands (Samoa, Bismarck Archipelago, Marshall Archipelago, Caroline Islands and the Marianne Islands), found many protozoal organisms, including *Entamoeba coli*, *E. histolytica*, *E. williamsi*, Trichomonads, *Fanapepea intestinalis*, and three new amoebae, the main subject of this paper. The author considers that there are two main groups of entamoebae: (1) nonpathogenic with 8 or more nuclei in the cyst, e.g. *E. coli;* (2) the *histolytica-tetragena* pathogenic type, whose cysts, when known, have 4 nuclei. *E. butschlii*, n. sp. provides a third type.

Entamoeba hartmanni, n. sp. occurred in a half-bred woman of Sawaii, mixed with *E. coli*. It is 4μ to 12-13μ with a vesicular nucleus 2 to 3·3μ. The cysts are small, thin walled, quadrinucleate. A thin, bacteria-like arrangement of chromidia is characteristic. Brown reserve material may be present in the cysts.

Entamoeba butschlii, n. sp., was found in one Caroline Island child at Saipan, who also suffered from ankylostomiasis and ascariasis, while *E. coli* and trichomonads were also present. *E. butschlii* is 10 to 24μ, with coarse alveolar cytoplasm, vesicular nucleus, round karyosome and centriole. A promitotic spindle is formed in division. The cysts are round and differ from those of *coli.*

Entamoeba pitheci, n. sp., was present in the mucus and aggregated in a polypus of a young orang-utan, *Pithecus satyrus.* The monkey also harboured ascarids, trichomonads and *Macrostoma.* The parasite is extraordinarily variable, 10 to 26μ in size, with a nucleus 4μ to 6-7μ. The endoplasm is very alveolar, and the alveoli undergo considerable alteration of form and position during movement, or by action of ingested bacteria. A nuclear membrane, which is granular, is present. The cyst wall is usually thick, but *E. coli*-like cysts also occur.

H. B. F.

GAUDUCHEAU (A.). **Recherches sur la Multiplication des Entamibes.**—*Far Eastern Assoc. Trop. Med.*: *Trans. Second Biennial Congress held at Hongkong*, 1912. pp. 74-86. With 2 plates.

The author deals with an entamoeba from dysentery and liver abscess in Tonkin. The entamoeba is culturable and is the same as that partially described by him under the name *Entamoeba phagocytoides.* The author's summary is as follows:—

"Amoebiasis, either intestinal or hepatic, is the cause of nearly half the deaths of Europeans in Tonkin.

"I have isolated and cultivated an Entamoeba from dysentery of man which multiplies by multiple budding and forming large branched plasmodia.

"The adaptation of the parasite to artificial media is difficult and progressive.

"The adapted protozoa feed entirely on the cultures of the bacilli of the Coli group, on nutritive agar, and form spirochaete-like bodies in culture.

"The ectoplasm is clear and forms pseudopodia which may be similar to an undulating membrane.

"There are endogenous buds growing in the amoebae.

"In the intestine of man as well as in that of the young dog injected with cultures of Entamoeba, we find all the intermediate stages between Entamoebae and Trichomonas.

"We find in the human bowel branched plasmodia from which flagellates are produced, in the same way as amoebae in cultures.

"The Flagellate is able to become an amoeba.

"Our conclusion is the unity of Entamoeba and Trichomonas.

"Entamoebae have three stages in their life-cycle: (1) the pathogenic parasite of the tissues; (2) the parasite of bacteria; (3) the flagellate or free stage of the protozoon entirely developed.

"The study of the total life-cycle of each species of Entamoeba must precede their systematic classification."

[Without expressing an opinion on the results, it should be noted that the figures illustrating the paper are not very convincing and are not explained. The work obviously needs confirmation, though WASIELEWSKI and HIRSCHFELD (1910) described culture-amoebae in which, in vegetative life, creeping forms could pass over into swimming forms with two flagella.]

H. B. F.

GAUDUCHEAU. **Observations sur Quelques Entamibes.**—*Bull. Soc. Méd.-Chirurg. de l'Indochine.* 1912. Oct. Vol. 3. No. 8. pp. 525-527.

(1) *Phagedaena-producing Entamoebae.*—The amoebae occurred in abundance in the pus of a cutaneous abscess (DAGORN and HEYMANN'S case; see below). Twenty-four hours after the abscess was opened the amoebae were seen to be digesting elements of the cutis proper. The abscess doubled in size during the last two days of the patient's life. The entamoebae occurred in association with a short, fine bacillus. The author thinks that amoebae are endowed with great activity in certain cases, not because they belong to a particular species, but because they are favourably associated with bacteria. In cultures the development of the amoebae depends upon the species of bacteria which serve for food. The fermentative secretion of the associated amoebae and bacteria is more intense than that of bacteria alone.

Most of the fixed amoebae exhibited alveolar cytoplasm and did not contain either bacteria or red blood corpuscles.

(2) *Intestinal Entamoebae*—found in the stools of a dysenteric patient. The fixed cysts of the entamoeba measured 15μ and contained four to six nuclei. The author has observed previously a similar cyst with six nuclei in the intestine of a monkey which had been inoculated subcutaneously with dysenteric bacilli and at the same time with a culture of *Entamoeba phagocytoides* introduced into the rectum.

In the faeces of the patient were vegetative entamoebae 10 to 20μ and also a large number of amoebae of the *limax* type from 5 to 10μ, with nuclei intermediate in character between that of *limax* and of *Entamoeba.* Possibly the forms are capable of transformation the one into the other under these conditions.

The so-called *limax* amoebae are in structure and size like the *Entamoeba phagocytoides* cultivated by the author in 1907, and found in the intestines of dysenteric cases and in water. They are capable of multiplying in the intestine of animals and are not purely saprophytic. There cannot be any doubt as to their true parasitic nature.

H. B. F.

DAGORN & HEYMANN. **Abcès Amibien du Foie, suivi de Phagédénisme de la Plaie Opératoire et d'Abcès Cutané Amibien.**—*Bull. Soc. Méd.-Chirurg. de l'Indochine.* 1912. Oct. Vol. 3. No. 8. pp. 518-524.

A detailed account of a case of liver abscess and dysentery. After the abscess had been successfully opened the wound became phagedenic, and in its neighbourhood a small cutaneous abscess formed, in the pus of which were found large numbers of amoebae. [No record of any bacteriological examination of the wound is given.] The dysentery persisted and the patient died. Very full notes of the post-mortem examination are given.

S. R. D.

Anderson (A. R. S.). Abscess of Liver with Amoebae, but without Antecedent Bowel Disease.—*Indian Med. Gaz.* 1912. Oct. Vol. 47. No. 10. pp. 398-399.

An account of a case of liver abscess in the pus from which numerous amoebae were found. No history of previous bowel disease could be obtained either from the patient or his wife.

S. R. D.

BACILLARY DYSENTERY.

Violle. Dysenterie Bacillaire.—*Arch. Méd et Pharm. Nav.* 1912. July. Vol. 98. No. 7. pp. 61-67.

An account of an epidemic of dysentery occurring at Cherbourg amongst the naval and military forces engaged in manoeuvres. The origin of the epidemic was never ascertained, but the author puts forward three hypotheses:—

(1) The pollution of certain parts of the city water supply. (2) The use of certain obsolete fortifications supplied with water from tanks liable to contamination. (3) The presence of "carriers" amongst the soldiers.

During the epidemic there were 104 cases with four deaths. No special clinical symptoms were noticed. Attempts to isolate dysentery bacilli failed owing to the plates being overgrown with the ordinary faecal bacteria. Investigations into the agglutinating power of the patients' serum taken eight to ten days after the commencement of the disease gave positive results in 68 per cent. of the cases.

24 per cent. agglutinated *B. dysenteriae* Flexner and Shiga.
28 per cent. agglutinated B. Flexner only.
16 per cent. agglutinated B. Shiga only.

The technique used was examination for agglutination under the microscope; serums showing agglutination in dilutions of 1:20 for Shiga's bacillus and 1:80 for Flexner's were considered positive. Deviation of the complement was also obtained in the case of ten of the patients' serums, all of which gave a positive agglutination. A search was further made for the presence of precipitins in six cases; two of these showed a distinct reaction and both these serums agglutinated both the Flexner and Shiga bacillus. The question of leucocytosis was investigated in ten cases, in all of which it was found; the highest number of leucocytes was 13,000 per cmm., the polymorphonuclear cells being relatively the most numerous. Eighty of the cases were treated with Dopter's serum with excellent results, the doses used being from 20 to 120 cc.; there were no deaths amongst these cases.

S. R. D.

Aenstoots (Fr.). Wachstumshemmungen von Ruhrbacillen auf Malachitgrünagar. [Inhibition of Growth of Dysentery Bacilli on Malachite Green Agar.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1912. Aug. 10. Vol. 65. No. 6-7. pp. 583-586.

Several cases of dysentery had occurred in the Bacteriological Laboratory of the Hospital and Asylum of Stephansfeld in Alsace during the previous summer. The presence in the Institution of various typhoid carriers rendered it necessary to make periodical examinations of stools for typhoid bacilli, involving preliminary distribution of the matter on plates of malachite green agar (agar four per cent.). The author noticed that fuchsin sulphite plates inoculated with washings of these never gave growths of dysentery bacilli; and thought at first that this might be due to the lack of motility in dysentery bacilli. But repeated shakings with subsequent inoculation on Petri dishes gave the same result. Direct inoculations of such plates, however, with the stools gave rise to growths of dysentery bacilli, and in consequence the author thought it worth while to make special cultures on the medium with various bacilli of the dysentery type, with the following results:

(1) In the first 24 hours no growth with any of the three varieties tested.
(2) On the second day, type Y gave a few isolated colonies, and on the third day an evident, but only moderate growth.
(3) *Bacillus dysenteriae* Flexner, and
(4) Shiga-Kruse gave practically no growth at all.

Repeated experiments led to the same results.

The author then tried twelve other varieties of intestinal bacilli, such as typhoid, para-typhoid, coli, Gaertner, on the same medium and gives tables of the results. All will grow more or less freely on malachite green agar with the characteristic change of colour in the medium. He concludes that refusal to grow on malachite green agar is a specific reaction for dysentery bacilli.

S. R. D.

Romm (M. O.) & Balaschow (A. J.). i. **Die Ruhrepidemieen der Jahre 1910-1911 in Kiew und ihre Erreger.** [The Epidemics of Dysentery in Kieff in the Years 1910-1911 and their Infective Agents.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1912. Sept. 19. Vol. 66. No. 2-4. pp. 246-255. ii. **Ueber Agglutinine im Krankenserum bei der Bacillenruhr.** [On Agglutinins in the Serum of Dysentery Patients.]—*Ibid.* Oct. 12. Vol. 66. No. 5-6. pp. 426-442.

i. The authors examined stools from 214 cases occurring in the course of the above epidemics and found *B. dysenteriae* Shiga-Kruse the cause of ninety per cent. of the cases, Type Y (= Hiss-Russel) furnishing seven per cent. and Flexner 2·8 per cent. From their experiments they conclude that carbohydrate reactions and agglutination tests with immune rabbit serum are the only reliable means for distinguishing the Shiga-Kruse bacillus from the mannite fermenters.

ii. The authors consider the question of the amount of agglutinating power in the blood serum of patients suffering from dysentery and conclude with Lenz, Kruse, and others that a dilution of 1:50 is the lowest limit for specificity for the Shiga-Kruse and 1:100 for types 2 and 4 (Lenz). They also investigated the date of supervention of the agglutinin reaction and found that it becomes positive towards the end of the second week in practically all cases. The duration of the reaction they were unable to investigate satisfactorily owing to the removal of patients. The highest dilution observed giving a positive result was 1:800.

With **Dorr** and **Lüdke** the authors find that the activity of the reaction is in proportion to the severity of the case. There is practically no agglutination of the Shiga-Kruse bacillus when the disease is due to the mannite fermenters and this fact may be used for the purpose of clinical differentiation.

S. R. D.

Hunt (C. J.). **Bacillary Dysentery. A Contribution to the Study of the Epidemiology.**—*Jl. Amer. Med. Assoc.* 1912. Sept. 21. Vol. 59. No. 12. Pt. 1. pp. 919-924.

An article on certain outbreaks of dysentery. The author's principal conclusions from his investigations are:—That bacillary dysentery should be a notifiable disease and that powers should be granted to the health authorities to investigate all outbreaks and to take measures to combat the suspected source of infection; that the term dysentery should be a wide one and applied to all diseases due to the various forms of dysentery bacilli, terms such as "paradysentery" being avoided. The author also notes that in several instances the incidence of typhoid fever has markedly increased ten to 21 days after an outbreak of dysentery.

S. R. D.

Messerschmidt (Th.). **Ueber das Vorkommen von Bakterien der Ruhrgruppe (Typus Y) in der Aussenwelt.** [On the Occurrence of Bacteria of the Dysentery Group, Type Y, in Nature].—*Deut. Med. Wochenschr.* 1912. Sept. 26. Vol. 38. No. 39. pp. 1827-1828.

In view of the prevalence of dysentery in Alsace-Lorraine, and the necessity for taking measures to overcome it, the author was deputed by the authorities of the Strasburg Institute for Hygiene and Bacteriology to enquire into the local prevalence of dysentery bacilli. **Uhlenhuth**, **Hubener**, and **Xylander** have shown that bacteria of the paratyphoid group occur outside of the human body and that they can often be demonstrated in the dejecta of pigs and other animals; it seemed probable that the same would hold good for dysentery bacilli. A beginning was therefore made with the stools of rabbits. The animals were obtained from dealers and kept at the Institute in separate disinfected iron cages. As no work on dysentery was being carried on at the Institute at the time, the possibility of local infection could be excluded. The examination was carried out as follows. Fresh stools were rubbed up with sterile salt solution and two to three drops of the supernatant fluid were spread upon Petri dishes and incubated at 37° for 24 hours. In two out of forty rabbits repeated examination showed the constant presence on each plate of from twenty to thirty colonies, which could not be distinguished culturally from dysentery bacilli of the Y type. Morphologically they appeared as gram negative, non-motile rods. Culturally, the following results were obtained:

Medium.	Growth.
Endo-agar plates	Colourless, ropy drops.
Gelatine	Not liquefied; edges indented.
Potato	Soft, colourless film.
Agar plates	Soft, transparent colonies.
Bouillon	Uniformly turbid; no indol in ten days.
Litmus milk	Slightly reddened; not turbid.
Milk	Not coagulated.
Grape-sugar broth ...	No gas.
Neutral red agar... ...	Not altered. No gas.
Litmus-mannite broth ...	Reddened. No gas.
Litmus-maltose broth ...	Blue. No gas.
Cane-sugar broth	Blue. No gas.

Biological reactions.—Suspensions of a 24 hour growth on sloped agar agglutinated with:

(1) Dysentery Y serum, in a strength of 1:10,000.
(2) Flexner immune serum (1 in 5,000), in a strength of 1:50.
(3) Shiga-Kruse immune serum (1 in 800), in a strength of 1:20.

Pathogenicity to animals was tested with 24 hour broth cultures as follows:

One mouse withstood 0·1 cc. given intraperitoneally.

One rabbit showed symptoms with 2 cc. injected intravenously, but did not succumb.

One of the rabbits which had furnished the dysentery bacilli was killed and examined, but the alimentary canal showed no lesions. In the caecum, similar bacilli were detected by culture. The other rabbit was allowed to live, but showed no signs of illness. On the strength of these results, the author supports the views of KRUSE, who found pseudo-dysentery bacilli in the faeces of monkeys (*Macacus rhesus*). Though such animals may exhibit no signs of disease, they may act as carriers.

S. R. D.

MAYER (Otto). **Eigenartige bakteriologische Befunde bei Gesunden aus der Umgebung Ruhrkranker.** [Exceptional Bacteriological Results with Healthy Subjects in Contact with Cases of Dysentery.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1912. Oct. 12. Vol. 66. No. 5-6. pp. 328-335.

The author was able to isolate from the stools of two apparently healthy soldiers bacilli not distinguishable culturally and otherwise from the bacillus of Flexner. Cultures on agar were reinoculated every four weeks and the strain isolated preserved its characteristics with fidelity. Inoculations into mice gave rise to characteristic bowel lesions. As illustrating the uncertainty which surrounds our methods for discriminating between the different varieties of these bacilli, the author sent specimens to the

Bonn Institute of Hygiene, where the agar cultures were pronounced to be coli-bacilli having an exceptionally high agglutinating power towards the Institute's stock serums, while the others were pronounced to be true dysentery bacilli of the Y type. He considers that his observations point to the possibility of healthy individuals serving as dysentery carriers.

S. R. D.

UNCLASSED.

DENIER (A.). Un Cas de Dysenterie Mixte provenant de Shang-Haï. —*Bull. Soc. Path. Exot.* 1912. July. Vol. 5. No. 7. pp. 468-469.

A short account of a case of chronic dysentery. Microscopical examination of the stools disclosed the presence of numerous *Amoeba tetragena* and when half-grown cats were fed on the stools dysenteric symptoms appeared. Further investigations made by planting out the faeces on Drigalski-Conradi's media showed the presence of numerous *B. dysenteriae* Flexner.

S. R. D.

MÜLLER (O.). Die chirurgische Behandlung der tropischen Dysenterie. [The Surgical Treatment of Tropical Dysentery.] —*Münch. Med. Wochenschr.* 1912. Oct. 8. Vol. 59. No. 41. pp. 2224-2226: and [English version] *Far Eastern Assoc. Trop. Med.: Trans. Second Biennial Congress held at Hongkong,* 1912. pp. 91-96.

The author has operated on four cases of dysentery, two amoebic and two bacillary, by means of appendicostomy, with good results. All four cases occurred in young male Europeans from 19 to 32 years of age who had suffered from the usual symptoms for months, the patient in one case being apparently in extremis. The author prefers a transverse incision through the oblique abdominal muscles to a vertical one by the side of the rectus, as giving more mobility to the appendix and avoiding the risks of gangrene by pressure from the edge of the rectus. Before suturing the appendix finally to the abdominal wall, he passes a catheter down to the caecum to see that the lumen of the appendix is patent. From the excised apex of the appendix the characteristic amoebae or bacilli could be isolated in every case. The bowel was washed out twice a day with a 1:500 solution of collargol in the first case, and with a half per cent. solution of quinine in the second one, afterwards changed to collargol and then to tannigen. The third and fourth cases, like the first one, were treated with collargol exclusively. Normal stools, subsidence of the disease, ability to take ordinary food, and increase of weight to a very satisfactory extent are reported of three of the cases, which were discharged to Europe for the final closure of the fistula. The fourth patient had a relapse in hospital, owing to indiscretions in diet (eating another patient's food), and seems to have left the hospital prematurely before much weight was gained. The author thinks appendicostomy much safer than any incision into the caecum itself on account of the frequent thinning of the caecum wall in these cases.

S. R. D.

OHLY (Adolf). **Ueber Procto-Sigmoiditis nebst einem Fall von Colitis ulcerosa und Colitis dysenterica chronica.** [On Procto-sigmoiditis, with a Case of Ulcerative Colitis and one of Chronic Dysenteric Colitis.]—*Deut. Med. Wochenschr.* 1912. Oct. 24. Vol. 38. No. 43. pp. 2022-2025.

The author desires to draw attention to the importance of using the sigmoidoscope or other similar instrument for the purpose of inspecting the lower part of the bowel in all cases of chronic haemorrhage from the anus. Too often such cases are dismissed with the offhand diagnosis of piles. Among the cases recorded is one due to tropical dysentery, *Entamoeba histolytica*, Schaudinn being the causative agent, in which the lower twelve inches of the bowel had been converted into a kind of rigid tube by successive ulcerations and cicatrisations of the mucous membrane. Treatment with diet and various antiseptic injections followed, naturally with not much benefit.

S. R. D.

HAYES (Charles A.). **The Prophylaxis and Treatment of Dysentery.** —*China Med. Jl.* 1912. July. Vol. 26. No. 4. pp. 223-236.

A review of the various methods of treatment and prophylaxis.

S. R. D.

NATTAN-LARRIER (L.). **Infection Humaine due à** *Tetramitus Mesnili.—Bull Soc. Path. Exot.* 1912. July. Vol. 5. No. 7. pp. 495-499.

A detailed account of a case with dysenteric symptoms contracted on the Ivory Coast. Examination of the stools and mucus showed large numbers of *Tetramitus mesnili* together with cysts of *Entamoeba tetragena.* (A plate is given illustrating the *Tetramitus mesnili*). *Tetramitus mesnili* in fresh preparations was very motile, progressing with the thickest end forward, and showed slow twisting movements.

Stained with iron-haematoxylin the organism was found to be about 12μ long, 6μ in largest transverse diameter, and about 3μ to 3½μ in the smallest diameter. Smaller forms were about 6½μ by 3μ by 2μ; the shape was pyriform. The protoplasm was finely reticulated and contained two or three vacuoles; a sharply defined nucleus, situated in the anterior portion of the organism, to 2½μ in diameter. The flagella, generally three in number, were from 9μ to 13μ in length. The cytosome was 6μ in length and 1½μ in breadth at the lower end; the orifice, which was difficult to see, was about 3μ in breadth.

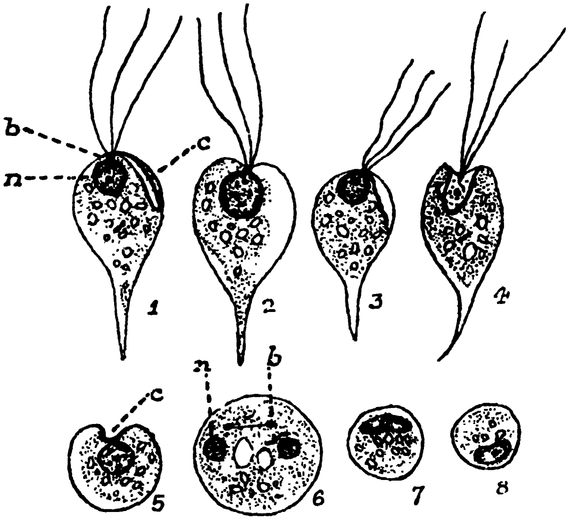
The author states that in this case the *Tetramitus* had, in his opinion, but little pathological importance.

S. R. D.

BRUMPT (E.). Côlite à *Tetramitus Mesnili* (Wenyon 1910) et Côlite à *Trichomonas intestinalis* Leuckart 1879.—*Blastocystis hominis* n.sp. et Formes Voisines.—*Bull. Soc. Path. Exot.* 1912. Nov. Vol. 5. No. 9. pp. 725-730.

The author notes that *Tetramitus mesnili* greatly resembles *Trichomonas intestinalis* in the fresh state, and is frequently confused with it. *Tetramitus mesnili* was imperfectly described by DAVAINE as *Cercomonas hominis* and was called *Macrostoma mesnili* by WENYON in 1910. It is the same as *Fanapepea intestinalis* of PROWAZEK, 1911, seen in Samoan Islanders.

Brumpt gives full details of a case of colitis in a French woman who had never left France, and in whose stools numerous *Tetramitus* occurred. He considers that *T. mesnili* is pathogenic. Twelve figures of the flagellate are given, including dividing and encysted forms.



Tetramitus Mesnili.

Figs. 1–5, as seen in smears of faeces : Fig. 6, dividing form : Figs. 7 and 8, cysts. *n*, nucleus ; *b*, blepharoplast ; *c*, cytostome.

Brumpt thinks that the so-called cysts of *Trichomonas* are really *Blastocystis hominis* n. sp., of which he gives 21 figures. He has also seen *Blastocystis* in a monkey (*Cercopithecus ruber*), in a toad (*Bufo vulgaris*), and in a leech (*Haemopis sanguisuga*).

Lastly, the author describes a case of colitis due to *Trichomonas intestinalis* in a patient returned from Tonkin. Amoebae were absent. Some of the *Trichomonas* had ingested red blood corpuscles. He considers *Trichomonas intestinalis* to be specifically different from *Trichomonas vaginalis*.

H. B. F.

LEPROSY.

TRANSMISSION.

McCoy (G. W.) & Clegg (M. T.). **A Note on Acid-fast Bacilli in Head Lice** (*Pediculus capitis*).—*U.S. Public Health Rep.* 1912. Sept. 6. Vol. 27. No. 36. pp. 1464-1465.

With the doubtful exception of a louse which had been fed on a leproma four and a half hours before (Ehlers, Bourret and With), the occurrence of acid-fast bacilli in lice has not been reported, though they have several times been found in other insects. The authors, however, found in two head-lice, taken from an advanced case of nodular leprosy with a forehead leproma invading the scalp, large numbers of acid-fast bacilli which in grouping, morphology, and staining reactions were indistinguishable from lepra bacilli. Several other cases were examined with negative results.

J. Henderson Smith.

Leboeuf (A.). **Recherches Expérimentales sur la Valeur du Rôle que peuvent jouer certains Insectes Hématophages dans la Transmission de la Lèpre.**—*Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 667-686.

The possibility of biting insects acting as transmitters of the lepra bacillus has been studied by many observers, with in some cases discordant results, and in this paper Leboeuf gives the results of a direct experimental investigation of this question, reserving for a later work a survey of it from an epidemiological point of view. He examined mosquitoes, bed-bugs, lice, and fleas; and his general method was to look for acid-fast bacilli in them, firstly as caught in their natural state, secondly after feeding them upon lepromata rich in bacilli, and thirdly after feeding them upon patients whose blood contained the bacilli.

The mosquito group was represented by *Stegomyia calopus*, and by a *Culex* sp.? Out of eighteen Stegomyia and six Culex, caught in a room containing four lepers and obviously not long after feeding, he found acid-fasts in one only. In insects fed upon lepromata he occasionally met with acid-fast bacilli, but only rarely, considering the enormous numbers present in the tissue. This rarity in the stomach of the insect is not due to the bacilli losing there the acid-fast character, as was shown in controls, and he believes the proboscis of the insect must be inserted directly into a blood-vessel, before suction begins. Naturally when feeding is done on blood which contains bacilli in the leucocytes, these pass into the stomach of the insect with the blood, but such cells are always rather rare and no multiplication occurs in the insect.

Cimex lectularius in its natural state was found to contain acid-fasts once in 41 specimens which had the opportunity of being infected. The bed-bug, when fed on lepromata directly, took up more bacilli than the Stegomyia or the Culex, but still not many, and no multiplication occurred inside it. *Pulex irritans* was not tested on bacillus-holding blood, but took up very few when fed on lepromata, and there was no multiplication. Great difficulty was experienced in obtaining lice, and the experiments with these were incomplete and rather unsatisfactory.

On the whole Leboeuf thinks that, although undoubtedly the organisms occasionally pass into these parasites, the number must be so small as to make insignificant the part which these agents can take in the transmission of leprosy.

J. H. S.

Leboeuf (A.). i. **Le Lèpre fruste en Nouvelle-Calédonie.**—*Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 578-584. ii. **Dans la Lèpre chez l'Homme, comme chez le Rat, on peut trouver des Bacilles Spécifiques dans les Ganglions Superficiels.**—*Ibid.* pp. 569-571.

i. In 1897 Auche, examining the skin of persons apparently healthy but living in immediate contact with leprous individuals, found acid-fast bacilli, apparently lepra bacilli, in seven out of 29 cases. Leboeuf was able to obtain the subsequent history of five out of these seven cases, and it appears that two died without developing leprosy, that one is still alive and apparently well, and that the other two became avowed lepers. Leboeuf believes that many more persons are infected with leprosy than statistics would lead us to suppose; but that the subsequent course of the infection is extremely uncertain. In many the disease advances very slowly for long periods, while in others it comes to an end and an actual cure is the result.

Amongst the natives of New Caledonia are many individuals who present slight indications of the disease, but actual discovery of the bacillus is difficult. These indications are usually of one or other of four types:—(1) the little finger is retracted to form a hook; (2) the ulnar nerve is large and tender—in these two types he never found the bacillus; (3) a few isolated spots of anaesthesia are present; he has once found the organism in a case of this type; (4) there is a disturbance of the sensibility to heat; in these cases he has several times found the bacillus. These slight cases may recover, or they may go on to open leprosy. The author knows of a number of cases which at one time showed only symptoms of the third type, and of these some developed the disease in due course, while others are apparently quite well. It is however always difficult to be sure of cure without the lapse of long periods of time. He describes a case in which the disease was manifest and the bacilli were found, but all symptoms disappeared and a period of quiescence ensued, to be eventually followed by a rapid development of outspoken leprosy. The occurrence of cures, or at any rate of cases in which symptoms are latent for long periods, is a probable explanation of the gaps which occur in the series when one endeavours to trace the disease from case to case, and carriers may exist who never show symptoms at all.

ii. A letter communicated to the Society stating that Leboeuf had punctured the lymphatic glands of five healthy individuals living in the immediate neighbourhood of lepers. Of these one showed many typical lepra-bacilli in a lateral cervical gland, but it is possible that certain signs in this case should be interpreted as indications of leprosy.

J. H. S.

JERUSALEMY. **Considérations sur la Possibilité de la Transmissibilité de la Lèpre par la Variolisation.**—*Rev. Méd. et d'Hyg. Trop.* 1912. Vol. 9. No. 1. pp. 38-43.

The supply of lymph in China being limited to a few large centres, the usual method of inoculation for smallpox in that country is to employ material from a case of the disease. A suitable pustule is selected and pricked, and then a plug of cotton-wool is soaked in the material which exudes. This plug is inserted into the nostril of the child to be inoculated and pushed in as far as possible. At the end of some days a discrete smallpox develops with, as a rule, only a moderate eruption. This method lends itself to the transmission of other diseases, and Jerusalemy reports a case in which leprosy was apparently so conveyed. Material taken from a child, whose father was afterwards found to be a leper, was used in this manner to inoculate another child, in whom three months later signs developed which Jerusalemy considered to be probably leprous, and in whose nasal mucosa large numbers of acid-fast bacilli were found. It is to be noted in this case, however, that the incubation period is short for leprosy, and that the accidental death of the child from whom the inoculated material was taken prevented the actual demonstration of its leprous condition.

J. H. S.

MERIAN (Louis). **Positiver Leprabazillenbefund im Inhalte einer Kuhpockenpustel bei einem an Lepra tuberosa leidenden Patienten.** [Lepra-bacilli found in a Vaccine Pustule on a Lepra tuberosa Patient.]—*Zentralbl. f. innere Med.* 1912. Oct. 5. Vol. 33. No. 40. pp. 989-995.

The occurrence of lepra bacilli in the pustules following vaccinia inoculation has been recorded by EICHHORST and by ARNING in cases of lepra tuberosa, and the transference of infection by the use of lymph from leprous individuals has been reported by GAIRDNER and by DAUBLER, and insisted on by BROWN. The present case is that of a young man admitted to hospital in Zurich with no family history of leprosy and no history of exposure, but born in Constantinople. He showed numerous patches of erythema on face, arms and legs, many of them raised and infiltrated; occasional swelling and usually pain in the joints of the limbs; enlargement and tenderness of the submaxillary, inguinal and axillary glands, and enlargement of the spleen; iritis and an anaesthetic and atrophic area beside the right knee; the blood gave a weak positive Wassermann reaction. Repeated examination of the nasal mucus gave constantly negative results, but the contents of a bleb raised upon one of the patches of erythema by the use of carbonic acid snow showed typically arranged acid-fast bacilli. The patient was then vaccinated with cowpox and the small pustules which developed by the second day contained typical lepra bacilli.

J. H. S.

Lindsay (J. W.). The Contagiousness of Leprosy.—*Brit. Med. Jl.* 1912. Sept. 21. pp. 682-683.

Writing from Paraguay in South America with twelve years' experience of a leper country, the author states that leprosy is spreading "like wild fire" in Paraguay. This rapid invasion has not been accompanied by any change in the diet of the inhabitants, and the people do not eat fish. He is convinced that at present leprosy is a far more contagious disease than tuberculosis of the lungs, and gives several striking instances of household infection.

J. H. S.

Hostalrich. Note sur l'Hérédité de la Lèpre en Pays Annamites.—*Bull. Soc. Méd. Chirurg. de l'Indochine.* 1912. Oct. Vol. 3. No. 8. pp. 511-513.

Without adducing any other evidence than the statement that in his apparently not very great experience a leper may live for long periods with his wife (or husband, as the case may be) with no appearance of disease in the latter, Hostalrich asserts that leprosy is a hereditary disease, contagion playing only a small rôle in its spread, and proposes sterilisation of infected persons by means of Röntgen rays as an advisable method of checking it.

J. H. S.

Marchoux (M. E.). The Problem of Leprosy.—*Brit. Med. Jl.* 1912. Nov. 2. p. 1191.

Applying the facts obtained in Marchoux and Sorel's study of leprosy in rats (see this *Bulletin*, p. 202) to the disease in man, Marchoux suggests that infection by contact may be as easy in man as it is in the rat, and that possibly there are many more persons infected with leprosy than is commonly believed, but they escape notice because they show no obvious signs. This might explain a number of curious points, e.g., Sand's observation that only ten per cent. of the children of leprous mothers become lepers themselves.

J. H. S.

Pattison (C. R. Maitland). The Contagiousness of Leprosy. [Memoranda.]—*Brit. Med. Jl.* 1912. Nov. 16. pp. 1386-1387.

A number of statements from the literature are brought together to illustrate the nature of the abrasions or wounds which are held to be necessary for the transmission of leprosy by contagion. They include Black's observation that the disease often manifested itself first in the nose, starting from a small ulcer or lesion, and Ross's case of a boy who pricked himself with a fish hook. The author, formerly Assistant Medical Officer at Robben Island, states that many of the medical officers and most of the leper attendants there have had longer periods of service than seven years without contracting the disease. Some observations which may be in favour of the hereditary theory are also brought forward.

J. H. S.

DELBANCO (E.). **Zur Verbreitung der Diphtherie und Lepra durch die Faeces.** [The Spread of Diphtheria and Leprosy by the Faeces.]—*Deut. Med. Wochenschr.* 1912. Nov. 14. Vol. 38. No. 46. p. 2175.

Draws attention to the possible importance of this mode of spread, and to the evidence that these organisms are evacuated through the faeces. He does not bring forward any fresh facts.

J. H. S.

ORGANISMS CULTIVATED FROM LEPROUS LESIONS.

LISTON (W. G.) & WILLIAMS (T. S. B.). **A Streptothrix isolated from the Spleen of a Leper.**—*Sci. Mem. by Officers of Med. and San. Depts. of Govt. of India.* Calcutta. 1912. New Series. No. 51. 5 pp. With 3 plates.

From the spleen of a leper, examined one and a half hours after death and showing many lepra bacilli, growth was obtained in four tubes, viz., on two of Dorset's medium, on one of Dorset's to which amoeba culture had been added, and once on lemco-agar. On each of these a single golden-yellow colony developed in three to four days. Study of the lemco-agar colony showed that, while on the third day it consisted of a partly acid-fast streptothrix, by the fourth day the filaments were divided into smaller fragments of which not so many were acid-fast. By the sixth day the filaments were still more broken up, and resembled cocco-bacilli, of which most were acid-fast. Subcultures gave free growth, which varied in colour on different media from golden-yellow to scarlet. The individual elements varied from coccal through bacillary to streptothrix forms, and the growth was either all non-acid-fast (ordinary agar), partially acid-fast (Dorset's), or all acid-fast (Rost). On Rost's medium even the non-acid-fast form produced an acid-fast organism, of which the streptothrix nature was more evident. In the spleen the occurrence of the streptothrix was demonstrated on section, and on inoculation into guinea pigs the organism may produce nodular swellings which contain acid-fast cocco-bacilli, mostly intracellular. The writers refrain from making any definite pronouncement as to the identity of their organism with the leprosy bacillus.

J. H. S.

REENSTJERNA (John). **Ueber die Kultivierbarkeit des Lepraerregers und die Uebertragung der Lepra auf Affen.** [Cultivation of the Lepra-organism, and Transmission of Leprosy to Monkeys.]—*Deut. Med. Wochenschr.* 1912. Sept. 19. Vol. 38. No. 38. pp. 1784-1785.

A preliminary communication. The author succeeded more than once in growing from leprous material pure cultures of an acid-fast organism morphologically resembling HANSEN's bacillus, and in continuing the culture for four generations. A male *Macacus rhesus* injected with a purely acid-fast culture developed a transient spot on the skin, the juice of which contained both acid-fast and non-acid-fast organisms. Another Macacus, inoculated with a pure culture of an organism resembling a simple streptococcus isolated from the blood of a leper, developed a bullous eruption, which contained both acid-fast and non-acid-fast organisms, some of which were contained in "typical lepra cells." A culture made from a single diplococcus, isolated by BURRI's method, produced in a monkey certain skin and muscular lesions, but acid-fast organisms were not recovered. The author regards the lepra organism as one which exhibits great polymorphism and may appear as a streptococcus or diplococcus, a diphtheroid or other rod. He looks upon the acid-fast character as one which the organism assumes only under certain conditions.

His medium was made in the following way. The floor of a 50 cc. Erlenmeyer flask is covered with pieces of human brain of about the size of a bean. On these are poured 15 cc. of a feebly alkaline broth containing four per cent. glycerin and one per cent. glucose, and the whole is sterilised at 120° in the autoclave. Then 10 cc. of sterile ascitic fluid derived from non-tuberculous patients are added. Various organisms develop the day after inoculation with leprous material and on the fourth or fifth day acid-fast bacilli appear; the culture is then treated with ten per cent. antiformin for about two hours and subcultures are made from the deposit obtained by centrifugation.

J. H. S.

BAYON (H.). **A Comparative Experimental Study of the Leprosy Cultures of Clegg, Duval, Kedrowsky, Rost, and Williams.**—*Brit. Med. Jl.* 1912. Nov. 2. pp. 1191-1194.

There is reason on general grounds to expect that the lepra organism, when it is obtained, will resemble more or less closely the tubercle bacillus. Morphologically and tinctorially they are alike and lepers are known to react to tuberculin in a manner similar to tuberculous patients, while the slow intractable course of the disease is alike in both. Leprosy is not a disease confined to the skin, but may produce visceral lesions not dissimilar to those of tubercle. In certain circumstances giant cells of the Langhans type may occur in lepromata and sometimes the resemblance is so close that only guinea pig inoculation can establish a diagnosis. The lesions produced by avian tubercle in fowls and guinea pigs very closely resemble those of leprosy. Hence we should expect the lepra bacillus to resemble the tubercle bacillus. On the other hand it is only slightly toxic, is less pathogenic for guinea pigs, and is not yet cultivable on ordinary tubercle media.

There exists a very wide-spread group of organisms of the type of *B. smegmae*, which are more or less acid-fast and occur in butter, grass, dung, earth, etc., and are probably of the same group as an organism found by BAYON in tap water. All these organisms grow easily at room temperature and on ordinary media, such as gelatine. They are frequently chromogenic, the pigment varying in intensity from milky-white through yellow to brilliant red, and the tint of the pigment of any one organism is variable, so that their distinction from one another by this test alone is unreliable. Injected in small quantities and alone they are non-pathogenic for guinea pigs, but in large amounts intravenously they may produce necrotic caseating nodules in the internal organs (though it is doubtful whether multiplication occurs), and injected intraperitoneally in small quantities together with butter and fat they may produce peritoneal nodules often very like tubercle. These organisms are readily enough recovered from the animals. The first growth may be very slow indeed, but eventually they can all be got to show growth in three days at 37° C. on agar. These organisms are therefore distinct from both leprosy and tubercle by their ready growth at room temperature, from tubercle by their feeble pathogenicity for guinea pigs, and from lepra by the necrosis which they may produce.

In studying the organisms which have been isolated from leprous material at different times, Bayon injected into animals KEDROWSKY's strain, DUVAL's, CLEGG's, ROST's Indian strain and his own cultures from rat and human leprosy, using monkeys, rabbits, guinea-pigs, rats, mice, fowls and pigeons. Only KEDROWSKY and his own two strains produced lesions reasonably like those of leprosy as met with in man and rat. These give a minimal tissue proliferation, no caseation-necrosis, no vascular sclerosis, and the lesions show enormous numbers of organisms. The other strains produce a different picture. DUVAL's for example, produced extensive necrosis, giant cells of the Langhans type with necrotic centres and a scarcity of acid-fast bacilli; and he states that the lesions produced by DUVAL's or ROST's strains could be successfully imitated by injections of saprophytic bacteria of the smegma type. In serological tests (complement fixation, agglutination, precipitation, and phagocytosis) the evidence Bayon has been able to produce, while still somewhat inadequate, points in the same direction.

By injecting ground-up human lepromata into rat-testes Bayon obtained a localised lesion, which took four months to develop. Whether multiplication occurred in this is doubtful, but from a lymphatic gland of this first animal he produced in a second rat, killed six months after inoculation, definite leprous lesions in spleen, liver, and lymphatic glands, and he has no doubt that growth occurred in the second animal.

He adds details of the medium with which he obtained his culture of the organism of rat leprosy outside the body. He regards this strain, which gives a very slow-growing moist non-pigmented growth, as very closely related to the human lepra bacillus.

An extract made from KEDROWSKY's strain in a manner similar to KOCH's old tuberculin produced a typical rise of temperature in three cases of nodular leprosy.

J. H. S.

DUVAL (Charles). **The Organisms isolated from the Lesion of Human Leprosy.**—*Brit. Med. Jl.* 1912. Nov. 2. pp. 1189-1191.

In this contribution to a discussion at the 1912 meeting of the British Medical Association Duval restates his position in regard to the organisms isolated from leprous material. His views may be summarised as follows. Two types of acid-fast bacilli may be cultivated from leprous lesions. The first of these is characterised by the fact, firstly, that as soon as it has become accustomed to a saprophytic existence outside the body it grows rapidly with a pigmented growth, and secondly that it is extremely polymorphic, being sometimes diphtheroid, sometimes streptothrical and of varying degrees of acid-fastness. Of this type are the organisms isolated by KEDROWSKY, CLEGG, BAYON, ROST and WILLIAMS, and others, as well as on several occasions by Duval himself. The second type is a bacillus which grows always slowly and only on special media, is non-chromogenic, and is always an acid-fast bacillus. This is the organism isolated by Duval. Both types may be present at the same time in the lesion, and may grow together in the cultures made from it; and this very fact has misled Duval himself in some of his previously published work. They are really distinct and a culture which contains both is a mixed culture.

That they really are different from one another, and that neither the non-chromogenic organism of Duval nor the chromogenic one of CLEGG is the same as any other known strain of acid-fast bacillus, is suggested by serological experiments with immune sera from animals. Neither experiments with human leper serum nor animal inoculations give results sufficiently definite to allow of conclusions one way or the other. The rôle played by the chromogenic type is quite unsettled, and the etiological importance of the non-chromogenic type is also unproven, but Duval considers that the latter deserves more serious consideration than any other organism yet isolated from human leprosy.

J. H. S.

TREATMENT.

WISE (K. S.) & MINETT (E. P.). **The Treatment of Leprosy by Nastin.**—*Jl. Trop Med. & Hyg.* 1912. Sept. 2. Vol. 15. No. 17. pp. 259-261.

For a period of four years, 244 unselected patients in British Guiana suffering from leprosy in various stages were treated by injections of nastin. Of this number at least 206 were under treatment for more than one year, and 118 for more than two years. Treatment was begun under the personal supervision of DEYCKE, who stayed some months in the colony, and afterwards followed the general lines laid down by him; and sufficient experience has been gained to permit of an estimate of the value of the method. This is not very encouraging. Some degree of improvement during the first three to six months is undoubted. There seems to be a general mental improvement with a humanising influence on the facies, softening of old lesions, increased suppleness of joints, slight decrease in the infiltrated areas and an increase in tactile sensation. But this early improvement is slight and only temporary, the condition retrogresses, the patient relapses, and the disease goes on as before. The British Guiana experience has thus been that during the first six months of treatment there is a slight temporary check to the disease, but otherwise the natural course continues unchanged.

J. H. S.

Bertarelli (Ambrogio). **L'Acide Phénique dans le Traitement de la Lèpre.** [Communication to the VIIth International Congress of Dermatology and Syphilis, Rome, April, 1912.] —*Lepra.* 1912. Sept. Vol. 13. No. 1. pp. 1-3.

A report of a case treated with carbolic acid, a method which has of late fallen into disuse. The patient had an extensive involvement of the skin, many of the areas being pigmented; a loss in the extremities of the heat and pain sensibilities, but no impairment of the sense of touch; a few small nodules below the skin of the arms and legs; a very bad general condition; and a persistent elevation of temperature. All attempts to reduce the fever, which was not accompanied by either albumin or sugar in the urine, were unsuccessful, and five months after the admission of the patient Bertarelli tried carbolic acid. He began by injecting 3 cc. of a one per cent. solution and increased the dose gradually until he was giving 20 cgm. of acid daily, even this amount being very well borne. In three months the improvement was most marked. The injections were continued for some months, and local injections of 7 cgm. were made into the neighbourhood of the small nodules, which disappeared but eventually came back.

On the whole the result of the treatment was very satisfactory. The fever disappeared completely, some dystrophic ulcerations healed up, and there was a remarkable amelioration of the general condition. Bertarelli recognises the effect which rest and altered hygienic conditions may produce and does not seek to lay undue emphasis upon his case, but he suggests that the carbolic treatment is worthy of trial in cases such as this when the drug is well borne.

J. H. S.

Currie (Donald H.), **Clegg** (Moses T.), & **Hollmann** (Harry T.). **Attempts at Specific Therapy in Leprosy.**—*Lepra.* 1912. Sept. Vol. 13. No. 1. pp. 25-57.

A large part of this paper is occupied with a detailed account of the experiences of previous workers in using different methods of treatment of leprosy. The authors thus review the literature dealing with the use of tuberculin, of iodine, of Carrasquilla's and other serums, of nastin and nastin-B, of Rost's leprolin, of methods based on the belief that persons bitten by poisonous snakes recover from leprosy, and various vaccines or bacillary extracts such as Williams', Whitmore and Clegg's, and those made from organisms separated out from leprous tissue. Under appropriate headings they record their own experience with tuberculin and iodine. They tried eight cases for several months with old tuberculin using doses of 0·0001 to 0·00142 mgm. but without obtaining any benefit. Potassium iodide they found in most instances produced a severe febrile reaction in doses of 2 to 3 gm., and also a hyperaemia of skin nodules; but this result was not always to be counted on. Thus one case, which at first reacted well to 2 gm. became immune later on and 30 gm. daily caused no reaction; another case did not respond to 6 gm. at a time, and a third case did not react till a daily dose of 33 gm. was given. A vaccine prepared from various well-known acid-fast organisms by Currie, as also an extract made from the same organisms, had no success.

The chief purpose of the paper, however, is to record the results which they have obtained by the use of vaccine made from the organisms, isolated and grown from leprous material, to which they give the name of '*B. leprae*,' or the use of various extracts made from these organisms. Their experience has been somewhat limited as yet, and they give details of all the patients treated; but the results so far may be summarised as follows. A vaccine, made in the ordinary way and administered subcutaneously, cannot be advantageously employed except in very small doses, since any attempt to give large quantities results in abscess-formation locally and a very slow absorption. Similarly, young living cultures produce abscesses unless given in small doses, and have had no beneficial results as yet, although deserving a further trial. Extracts made in the manner of Koch's old tuberculin have proved of little value; they also tried the effect of extracts of the fatty substance in the bacilli (prepared somewhat on the lines of nastin) but have not yet had time enough to form an opinion as to their merits. A few experiments were made with "sensitised" killed cultures, *i.e.*, cultures which had been exposed to the serum of monkeys previously injected with strains of '*B. leprae*.' They have also tried without apparent benefit the serum of a horse which had been immunised with such strains. The serum of this horse agglutinated the '*B. leprae*' in dilutions of 1 in 500, and they hope to obtain a more potent serum by continuing the immunisation.

J. H. S.

Rocamora (J. Peyri). **Le Salvarsan dans la Lèpre; son Influence sur le Wassermann dans cette Maladie.**—*Lepra.* 1912. Sept. Vol. 13. No. 1. pp. 4-9.

Besides 22 other cases in which the period of treatment has been less, Rocamora has had nineteen patients under salvarsan treatment for eighteen months and it is on these nineteen that this account is based. The drug was given intravenously in doses of 50 to 60 cgm. This method involved incision to expose a vessel in many cases of skin infiltration, but intramuscular injection proved too painful. The only ill effect following upon the injections was an exacerbation of the neuritis in anaesthetic cases. For the first year salvarsan was the only method of treatment used; after that chaulmoogra oil or antileprol (Bayer), whichever suited the patient best, was given in the intervals.

The number of cases is not large, but the duration of the treatment gives these results a value which is wanting to many other published accounts of the effects of salvarsan in this disease. Rocamora is impressed with its value. In two anaesthetic cases it was unsuccessful, and except in the very early stages the drug should not be employed in this condition. But in lepra tuberosa the effects are very gratifying, especially in the less advanced stages of the disease. Lepromata recede in size and degenerate, and the bacilli they contain are reduced in number. In affections of the mucous membrane, especially of the larynx and pharynx, beneficial effect is very marked. The lesions are reduced in area and may disappear, there is marked improvement in function, ulcers dry up, and oedema subsides. In nasal lesions the improvement may be slow, but it is always pronounced in tuberous leprosy and eye symptoms also show improvement. The general condition of the patient is always greatly benefited, with a return of interest and energy. On the other hand, nervous symptoms show no change for the better, and little effect is produced on ulcers due to trophic interference. The Wassermann reaction remains unchanged throughout, a result perhaps natural if the reacting substance is derived from an alteration of the tissues.

Rocamora considers that along with chaulmoogra oil salvarsan is the best defence against leprosy that we possess at the present time.

J. H. S.

WELLMAN (Creighton). **Salvarsan in Leprosy.**—*New York Med. Jl.* 1912. Nov. 16. pp. 996-1001.

Seven cases were treated with salvarsan [details of method are not given], two controls being treated with salt solution at the same time. One week before beginning the salvarsan, smears were made from the nasal mucus and from the blood, the urine was tested for sugar and albumin, the faeces examined microscopically, and a nodule was excised and examined by section for histological structure and for the number of contained *B. leprae*. Seven weeks after treatment was begun, a second parallel series was made from each case and the two series compared. The blood and faeces examinations showed no change, and the smears from nasal mucus nothing definite, although the bacilli had disappeared in one case. In four cases partial or complete resolution of the nodules was observed and in two cases the bacilli had disappeared. The time of observation seems short and the number of cases small, but Wellman concludes that some improvement may be expected, especially in early cases, though there is no evidence either that this improvement is permanent or that it is greater than is obtained with other forms of arsenic. No harm results from the administration of the drug in cases where the patient is not already weak from the disease. Some good microphotographs of sections and some photographs of clinical appearances are given.

J. H. S.

IMMUNITY.

CURRIE (Donald H.) & CLEGG (Moses T.). **Immunity.**—*Lepra.* 1912. Sept. Vol. 13. No. 1. pp. 10-16.

After a fairly comprehensive survey of the literature, the authors give the results of some experiments on complement fixation and agglutination with acid-fast bacilli. They used a number of organisms of the smegma type, viz.:—*B. smegmae*, Moeller's grass bacillus and bacilli from margarine, butter and urine, and four strains of '*B. leprae*,' i.e., organisms isolated from leprous material. For the complement fixation experiments they made extracts of these bacilli in five different ways, but three of these yielded extracts which deviated complement so strongly of themselves without the presence of any specific serum that no specific action could be demonstrated. With the other two methods, however, they were more successful. They used eight serums, viz.:—four from leprous patients, one from a horse which had been highly immunised to various strains of '*B. leprae*,' two from monkeys which had also been injected with similar strains, and one from a normal horse. They found that good complement binding occurred with the extracts of the lepra strains taken in conjunction with the serums of all four patients and with the immunised horse serum, and no binding with the monkey or normal horse serums. The same thing occurred with the extracts made from the margarine bacillus, and they conclude that leper serum together with extracts of certain acid-fast bacilli will bind complement, and that they cannot by this means differentiate the '*B. leprae*' from such bacilli.

The agglutination experiments gave a different result. The immune horse serum agglutinated all the lepra strains tried in a dilution of 1 in 200 and some of them in dilution of 1 in 1,000, but agglutinated none of the organisms of the smegma type. The serum of two patients with advanced tubercular leprosy failed to agglutinate any of the bacilli, but the serum of a patient, who had a leprosy of three years standing, although showing few symptoms at present, agglutinated the lepra strains in a dilution of 1 in 50, while not agglutinating the other organisms. The authors conclude that they could obtain agglutinins specific for the lepra organisms by injecting a horse with the lepra strains.

J. H. S.

Rat Leprosy.

Currie (Donald H.) & Hollmann (Harry T.). **Further Observations on Rat Leprosy.**—*Lepra.* 1912. Sept. Vol. 13. No. 1. pp. 17-24.

The authors describe in detail the post-mortem appearances in thirteen rats, which had been inoculated with rat leprosy some ten months previously by placing under the skin a small portion of the tissues of an infected rat, and also those of eleven rats, which had been exposed for several months to contact with well advanced cases of the disease and then kept by themselves for nearly a year. In this latter group of eleven animals four were normal but seven showed the presence of acid-fast bacilli. From the data thus given, together with observations previously published, they conclude that in this disease the lesions met with are practically the same, whether the animal is inoculated by a laboratory method or simply allowed to develop the disease from contact with infected rats (*i.e.*, the natural mode of infection).

Except for the local lesion which is occasionally produced at the site of inoculation, infection of the viscera seems usually to precede the skin lesions, and of the visceral lesions a bronchopneumonia is the most constant and often the earliest, although early infection of the spleen also occurs. The heart blood of infected rats often contains the bacilli of rat leprosy, and when this is the case no difficulty is experienced in demonstrating acid-fast bacilli in the mites (*Laelaps echidninus*) on the bodies of these animals. This last fact naturally suggests that these insects may play some part in transmitting the disease from rat to rat, but so far the authors have been unable to obtain any positive evidence that this really occurs. Thirty-two probably infected mites were placed on three rats (*M. alexandrinus*) and after nearly a year these rats were killed, but no sign of infection was found. In another experiment 100 house flies were fed on rat leprous material and then placed in a cage containing two healthy rats, whose tails had been scraped in order to attract the flies. These two rats also showed no sign of infection when killed nearly a year later.

All their attempts to cultivate the organism of rat leprosy have hitherto failed.

J. H. S.

MARCHOUX (E.) & SOREL (F.). (i) **Recherches sur la Lèpre. (1er Mémoire.) La Lèpre des Rats** (*Lepra Murium*). (ii) **La Lèpre des Rats. (2e Mémoire.) Recherches Etiologiques et Réflexions qu'elles suggèrent à propos de la Lèpre Humaine.**—*Ann. Inst. Pasteur.* 1912. Sept. Vol. 26. No. 9. pp. 675-700; and Oct. No. 10. pp. 778-801.

In these two papers the authors detail the results of an investigation into so-called rat leprosy, as it occurs in the rats of Paris, which they hoped might have some bearing on the similar disease in man. Of 1,296 animals systematically examined 65 or five per cent. (all of them sewer rats, *M. decumanus*) were found infected with acid-fast bacilli, but the percentage varied in different localities, and as many as fourteen, nineteen, or even forty-five per cent. of the rats in certain lots might be infected. Of the two recognised forms of the disease, the musculo-cutaneous was found only in 0·6 per cent. of all the animals examined; it was usually most developed in the posterior part of the body. In the glandular form the inguinal glands were affected at least as often as the axillary. Visible invasion of deep-seated organs other than lymphatic glands was rarely observed, and the authors attribute this immunity to the lungs, which serve as a filter and check the spread of the disease. The bacilli were always to be found in the lungs, particularly in the apices, and in these organs they do not give rise to nodules.

No difficulty was experienced in transmitting the disease to other rats, white rats being apparently even more susceptible than grey. Infection did not occur through unbroken skin; but slight scarification or even simple epilation was quite sufficient to allow the organisms to penetrate, infection taking place even more readily by these methods than by subcutaneous injection. The lesion produced was of the glandular type, if the inoculated material was not contaminated with other organisms, and as a rule the glands did not attain a large size. If, however, the material used be contaminated, *e.g.*, with *Staphylococcus pyogenes*, the disease may take on the musculo-cutaneous type. White mice were also successfully inoculated, though less readily than rats, but the attempts to transmit the disease to guinea-pigs and to a monkey failed. In all these inoculation experiments the authors used bacilli contained in the tissues of infected animals.

They did not succeed in cultivating the bacillus, which they found not to withstand drying nor heating at 60° C. for fifteen minutes.

It is possible to infect by intraperitoneal injections, and also through the digestive tract by massive doses, and it is of interest to note that the latter route may give rise to a primary lung infection without necessarily involving the cervical or mesenteric glands. In natural conditions infection occurs through the skin and spreads by way of the lymphatics, and the site of inoculation may show few bacilli when the neighbouring glands are full of them. The authors consider that fleas and lice play no part in the transmission of the disease, and that parasitic transference can play only a very small rôle, the common method of infection being direct contact with the skin of a diseased animal or with some object freshly contaminated by a diseased animal.

J. H. S.

UNCLASSED.

STEIN (R. O.). **Zur biologischen Differentialdiagnose von Lepra und Tuberkulose.** [Differential Diagnosis of Leprosy and Tuberculosis by Biological Methods.]—*Wien. Klin. Wochenschr.* 1912. Oct. 17. Vol. 25. No. 42. pp. 1559-1562.

It has long been known that guinea-pigs which are tuberculous do not react to an injection of tubercle bacilli in the same way as normal guinea-pigs. According to BAIL, if the injection is made intraperitoneally, the exudate in the tuberculous animal is characteristic, in that the cells which it contains are nearly all small lymphocytes, and the fluid itself is only slightly turbid. Such an exudate when added to large quantities of tubercle bacilli may kill normal guinea-pigs very rapidly, a fact which he attributes to a liberation of endotoxin from the bacilli by extracellular lysis. Further, if tubercular tissue is injected into normal guinea-pigs, they react to a simultaneous or subsequent injection of tubercular bacilli in much the same way as a tubercular guinea-pig would. Stein seeks to apply these observations of BAIL to the differentiation of tubercle and leprosy, and has repeated the experiments, using lepra bacilli for the injections instead of tubercular bacilli. He injected into tuberculous guinea-pigs the lepra bacilli, which he obtained by antiformin extractions of lepromata, and obtained an exudate similar in character to that obtained by the injection of tubercle bacilli. He did not however succeed in producing acute deaths in normal guinea-pigs by injecting lepra bacilli along with the characteristic exudate of tubercular guinea-pigs, nor could he after previous injections of lepromata (or antiformin extracts of lepromata) kill guinea-pigs acutely on the injection of tubercle bacilli. No extracellular lysis of lepra bacilli was observed in the exudate, and from these data he deduces an absence of "receptors for tuberculin" in lepromata. In this absence of receptors he sees the explanation of the failure of tuberculin as a cure for leprosy, and at the same time concludes that the reaction induced in lepers by the injection of tuberculin must be due to a concomitant tuberculosis.

J. H. S.

CHOLERA.

Epidemiology.

Defressine, Cazeneuve, Olivier & Coulomb. **Le Choléra Asiatique dans la Marine à Toulon, en Novembre 1911.**—*Arch. Méd. et Pharm. Nav.* 1912. Aug. Vol. 98. No. 8. pp. 104-137; and Sept. No. 9. pp. 194-211.

Oudard. **Note à propos de l'Epidémie de Choléra Asiatique dans la Marine à Toulon, en Novembre 1911.**—*Ibid.* Oct. No. 10. pp. 299-302.

Cholera appeared in Marseilles in October, 1910, and disappeared during the winter months, but returning again in June, 1911, without any discoverable source of infection, caused 466 cases in the town and its neighbourhood. It appeared to have died out once more by October, but in November a small outbreak occurred at Toulon Arsenal, which is the subject of these papers. It comprised eighteen cases with six deaths, the diagnosis being bacteriologically established in fifteen but lacking this proof in two in spite of repeated examinations. Of seventeen of these cases full clinical histories are given. In one of them with a rheumatic history, the cholera attack lighted up a typical shifting arthritis. In another the organism disappeared from the stools for eight days, then a relapse occurred and the vibrios reappeared and post mortem it was found that they had invaded the gall-bladder and set up a cholecystitis, a point of considerable interest in various respects (see Greig's paper, p. 214). The authors were impressed with the value in collapse of Hayem's artificial serum, which was given sometimes subcutaneously, sometimes intravenously in quantities of one to five litres, at the rate of about one and a half litres an hour.

With the exception of one amongst the harbour officials, all the cases occurred amongst the crews of five warships, and these were not lying close together, and the source of infection was traced to a particular part of the water supply. It appears that in French warships there is a three-fold supply of water. One is for drinking, and is distilled water with a separate system of pipes. The second is "washing water," the third is water for the boilers, etc., and these last two supplies are contained in systems which are mostly independent, but admit of partial communication at various points. This third supply was found to be infected with cholera. As supplied to the ships it is a mixed water, derived from inland sources which are liable to contamination, and there is little doubt that these sources had been infected by some carrier or mild case, probably a visitor from Marseilles. The immunity of the shore staff is attributed to their use of the water as it came from taps, the number of organisms being in this case small, in contrast to the water on the ships which was heavily infected. Multiplication no doubt occurred on board the ships, but most probably occurred also in the floating cisterns in which the pipe water was stored before being taken on board.

In four of the five ships, in which cases occurred, this water, and in some cases the "washing water" also, was found infected, and in five other ships the water contained cholera without any case developing. Systematic examination of all the crews of these ten ships being scarcely practicable, the stools of only such men as had been in contact with actual cases or were suspects on account of intestinal disturbance were examined, and eight carriers were recognised, six of them among the suspects and so probably mild cases. These carriers continued to excrete cholera vibrios for five days on the average, the longest being eight days. The water supply must have been contaminated after October 25, and before November 16, and was again free from vibrios by December 5th. Details of methods employed and considerations of the possibility of avoiding similar outbreaks in future are included.

Oudard emphasises the good results of large injections of artificial serum at the rate of four litres an hour, which he observed in a Shanghai epidemic in 1907.

J. Henderson Smith.

GASBARRINI (Antonio). **L'Epidemia Colerica nelle Puglie (Anno 1911).** [Outbreak of Cholera in the Puglia District.]—*Policlinico.* Sez. medica. 1912. Oct. Vol. 19. No. 10. pp. 461-478.

A preliminary account of an outbreak in Pulagianello in South Italy (Apulia). The district is mainly agricultural and the poorer inhabitants live in conditions of extreme squalor, with no sanitary regulations. It suffered from cholera in 1910, and in the present epidemic there were fourteen cases with eleven deaths, *i.e.*, 79 per cent. Most of the cases were of very severe type with a rapid course, and most of the patients had a previous history of other intestinal disorder. Nine carriers were discovered by bacteriological examination, most of them associated with actual cases. The outbreak was checked by isolation and general disinfective measures.

J. H. S.

BISHOP (T. H.). **A Cholera Season: Some Observations, Methods, and Results.**—*Indian Med. Gaz.* 1912. Sept. Vol. 47. No. 9. pp. 345-349.

A bridge across the Lower Ganges in Bengal is at present in course of construction and in connection with this work a large force of coolies is brought together, partly from the immediate neighbourhood, partly from adjacent districts which are notoriously subject to cholera. During the working season, which corresponds roughly with the cholera season, the coolies are housed close to the river, from which they derive drinking water and in which they bathe. It has long been considered improbable that the Ganges plays any part in the dissemination of the disease, but Bishop regards it as the chief factor in its spread in this part of Bengal. The main current is probably little affected, but, as the river falls, backwaters and shallow places develop near the banks, and in the comparatively stagnant water of these quiet places (which are the most frequented by the natives) Bishop thinks that cholera once introduced can breed and spread. The initial infection of such a spot may be due to a carrier, but a potent factor also is the " cholera-corpse " which has been carried down by the river after an incomplete incineration ceremony and strands on the projecting point behind which the backwater or eddy is formed. The prevention problem is particularly difficult in India owing to the domestic customs and religious beliefs of the Hindus, but a system of regular and thorough inspection of the surrounding villages and districts and careful disinfection measures amongst the coolies served to keep the disease within controllable limits. The treatment adopted for those infected was the exhibition of permanganate with adrenalin chloride (10 minims of a 1 in 10,000 solution) every three hours until the passage of urine was re-established. In severe cases of collapse hypertonic salt solution (Rogers' formula) was given intraperitoneally by means of a special trocar-cannula, which is figured, and which the author found very convenient and simple. The mortality in 173 cases was fifteen per cent., which compares well with that of the same districts in other years, and with that of other districts in the neighbourhood.

J. H. S.

Lionarons (A. C. W.). **Over Cholerabestrijding op Soembawa gedurende de Epidemie van 1911.** [Cholera Measures in the Soembawa Epidemic of 1911.]—*Geneesk. Tijdschr. v. Neder.-Indië.* 1912. Vol. 52. No. 4. pp. 426-430.

On the 11th January, 1911, a case of cholera appeared in a district of Soembawa (one of the Sunda Islands), 28 kilometres from the central town, and on the 26th the disease invaded the centre also. It was recognised on the 16th, the diagnosis being confirmed bacteriologically; energetic measures were taken, and on February 8th a supply of vaccine arrived. Vaccination was at once carried out on an extensive scale, 4,292 of the 5,064 native inhabitants of the central area being inoculated, and 11,076 of the 15,075 inhabitants of the neighbouring districts. The results are sufficiently striking. In the central area only two of the inoculated developed the disease, one dying, and in both cases symptoms occurred too soon (3 and 4 days respectively) after the injection for its full effect to have developed. Of the 772 who were not inoculated, no fewer than 74 died of cholera, *i.e.*, 9·6 per cent. In addition, there were 144 other inhabitants of this area, of whom all were inoculated and none developed the disease. In the surrounding districts only one inoculated person died, while there were 1,063 deaths among the uninoculated. The disease was of a very virulent type, death usually occurring in less than 24 hours. From the fact that in one contact symptoms came on 5 days after isolation it is inferred that the incubation period was at least 5 days.

J. H. S.

DIAGNOSIS.

HAENDEL & BAERTHLEIN. **Vergleichende Untersuchungen über verschiedene Choleraelektivnährböden.** [Comparison of Various Selective Media for Cholera.]—*Arbeit. a. d. Kaiserl. Gesundhtsamt.* 1912. Sept. Vol. 40. No. 4. pp. 357-432.

DIEUDONNÉ (A.) & BAERTHLEIN (K.). **Ueber Choleraelektivnährböden.**—*Münch. Med. Wochenschr.* 1912. Aug. 6. Vol. 59. No. 32. pp. 1752-1754.

ESCH (P.). **Zur Frage der Choleraelektivnährböden.**—*Deut. Med. Wochenschr.* 1912. Sept. 5. Vol. 38. No. 36. pp. 1682-1683.

DIEUDONNÉ's selective medium for the growth of cholera vibrios, which consists of seven parts of a three per cent. neutral agar added to three parts of a mixture in equal quantities of defibrinated ox-blood and normal caustic potash, has been found exceptionally efficient by various workers. It has, however, the drawback that, if the plates are used immediately after they are made, no growth of any kind occurs on them, and an interval of several hours, perhaps up to 18, must be allowed to elapse before they can be used. To get rid of this delay various modifications have been put forward, and Haendel and Baerthlein record here the results of a comparison of the original medium and five others more or less similar. These are (1) NEUFELD and WOITHE's, which contains lactic acid; (2) ESCH's, made from haemoglobin and caustic soda; (3) PILON's, made from blood and caustic soda; (4) the original medium, but dried and powdered; and (5) MOLDAVAN's, where the proportion of agar to blood-alkali is as four to one instead of seven to three. On all six media cholera vibrios grow well, but occasionally for some reason unknown growth fails completely on Moldavan's and the lactic acid medium, the plates remaining sterile. The agglutinability of organisms grown on these media was affected, if at all, to a quite insignificant extent. Vibrios resembling but not identical with true cholera grow well on Esch and on Pilon, less well but still freely on the original medium, and least well on Neufeld and Woithe.

The free growth of cholera on all the media is in marked contrast to that of other intestinal organisms. This was studied by inoculating plates with faeces either of normal persons or of persons suffering from some form of intestinal disturbance. Large numbers of plates were made, and the results may be summarised as follows. Of the original medium 66 per cent. of the plates were sterile, except for the presence of occasional cocci (the colonies of which bear no resemblance to cholera); with Neufeld and Woithe, 87 per cent. were similarly sterile; with the dried medium 42 per cent.; with Moldavan 65 per cent.; with Pilon, 22 per cent.; and with Esch only 5·7 per cent. The inhibition of other bacteria is thus very marked with most of the media. When plates were inoculated with similar material, to which small quantities of cholera had been added, the cholera was recovered without difficulty on all the media; but the best results were obtained with the original medium and with the dried medium, and excellent results with Neufeld and Woithe owing to the practically complete suppression of other bacteria. The other organisms which developed were mostly members of the Coli group, but an exceptional number of vibrios, not cholera, were found, viz., in eleven per cent. of all the stools examined. The latter were met with only in the stools of patients with intestinal affections, and in one of these cases the vibrio was actually recovered from the blood. *B. alkaligenes*, which occurred frequently on the plates, was also obtained from the blood in two cases. It is of interest to note that this bacillus has a marked tendency to assume on these media a vibrio-like morphology. This held to a less degree of other organisms also, and the point is of practical importance in diagnosis. Various other mixtures were also tried of cholera and the different organisms found to develop on the plates, but only rarely was there any difficulty in finding cholera on plates sown with such mixtures.

On the whole Haendel and Baerthlein conclude that these media all give better results and enable a diagnosis to be made more easily and more quickly than the older methods. The original medium is the best, and should be employed wherever possible, *e.g.*, in the course of an outbreak or in looking for carriers. The delay involved by its use, however, is so great that in the early cases or when rapid diagnosis is essential it is best to use one of the modifications, and they recommend the dried medium. The Neufeld and Woithe, as also Moldavan's, is better in some respects, but its occasional complete failure makes it necessary to use controls.

These improved methods still leave room for the use of enriching media, when the vibrios are few in number, and Haendel and Baerthlein have compared the old peptone-water method with two newer media, viz. (1) OTTOLENGHI's ox-bile to which three per cent. of a ten per cent. aqueous solution of sodium carbonate is added; and (2) the blood-alkali-bouillon method of KRAUS and his co-workers. The former gave results better in some respects than peptone-water, but not so consistently better as to justify the complete abandonment of the old method; while the latter gave regularly better results, but takes long to prepare and a preliminary test of its efficiency is necessary.

Dieudonné and Baerthlein's paper, though published before that of Haendel and Baerthlein, is simply a preliminary resumé of the results detailed by the latter. Esch's paper is a reply to it, in which he maintains that his medium is the best for the early cases, as good as any for the later ones, and, by reason of its greater convenience and the ease of preparation, the most useful in practice of them all.

J. H. S.

GALLI-VALERIO (B.) & POPOFF-TCHERKASKY (D.). **L'Agar d'Esch dans la Recherche de Vibrio Cholerae.**—*Centralbl. f. Bakt.* 1. Abt. Orig. 1912. Oct. 29. Vol. 66. No. 7. pp. 549-554.

The authors plated a long series of different organisms upon plates prepared according to ESCH's method (*vide supra*) and dried for one hour at 37° uncovered, a procedure which they found gave the most satisfactory results. About one half of the organisms grew, but many of these very badly indeed, and most of them developed several hours or even days after cholera or *V. metschnikovi*. Those which grew best were *B. faecalis alkaligenes*, *B. pyocyaneum*, *B. vulgare*, *B. fluorescens liquefaciens*, *S. lutea*, *M. pyogenes aureus*, and *M. ascoformans*. They could not observe any tendency of *B. faecalis alkaligenes* to assume vibrio-like forms. Cholera grew well, and growth was visible in nine to ten hours. From various mixtures of the above organisms with cholera they had no difficulty in isolating cholera in the early colonies; and in plates made from faeces to which cholera and *B. faecalis alkaligenes* had been added, the *V. cholerae* came up in almost nine hours and was readily obtained, the *alkaligenes* appearing much later. They recommend the medium highly, both for the excellence of the results it gives, and for the ease and rapidity with which it can be prepared.

J. H. S.

Signorelli (Ernesto). **Ueber die Züchtung der Choleravibrios in gefärbten Nährböden.** [Cultivation of Cholera on Coloured Media.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1912. Oct. 12. Vol. 66. Nos. 5-6. pp. 469-480. With 1 plate.

Signorelli, growing cholera on agar to which a dye had been added, found that, while with most of the stains used no visible change occurred except in some instances a simple decoloration of the medium, with erythrosin, safranin, orcein, and especially with dahlia the developing colonies take up the stain deeply and the medium is progressively decolorised. The stained organisms remain alive for some days, and retain their motility, though they lose their virulence after about two days. Other organisms, *e.g.*, *B. coli* and *lactis aerogenes*, behave similarly to cholera though showing minor differences; but Signorelli found that on dahlia other vibrios, resembling cholera but not true cholera, develop badly, and he believes a differential medium might be worked out on this basis. The staining of the organisms is held to be a direct accumulation of the dye in the bodies of the bacteria by some process associated with the life of the organisms, and not explicable on purely physico-chemical grounds; and it is this accumulation which produces the decoloration of the medium and not a reduction or other chemical change in the dye itself.

J. H. S.

Morelli (E.). **Die Pankreatinlösung zur Kultur der Mikroorganismen und besonders des Choleravibrio.** [Solution of Pancreatin for the Culture of Microorganisms, especially Cholera.]—*Centralbl. f. Bakt.* 1. Abt. Orig. Oct. 12. Vol. 66. Nos. 5-6. pp. 465-468.

Morelli recommends the use of pancreatin solution (pancreatin 2 g., NaCl. 0·5 g. Water, 100 g.) as a cholera culture-medium. It is advisable to use a preparation containing no lactose, *e.g.*, that of Parke, Davis. The alteration of lactose

during heat sterilisation may produce irregularities in the composition of the medium, and, even if filter sterilisation is employed, the fermentation of the lactose by other organisms in the case of mixed cultures gives rise to acid which checks the growth of cholera. It is claimed that the results obtained are better than with peptone water.

[Few details, and no figures given.]

J. H. S.

GIOSEFFI (M.). **La Gastroenterite Infantile nella Profilassi Anticolerica.** [Gastro-enteritis of Infants and the Prevention of Cholera.]—*Gazz. d. Ospedali e Clin.* 1912. Sept. 29. Vol. 33. No. 117. pp. 1218-1220.

Eight days after the first case of cholera had occurred in Trieste a boy of eight years was brought to the Hospital for Infectious Diseases suffering from suspicious symptoms, which proved to be cholera. Immediately on the occurrence of the case, the possible contacts (36 in number) had been isolated, but after the stools had been examined with negative results all were released except four, who had handled the soiled linen of the child. These were kept isolated for some time longer, and in two of the four vibrios appeared two to three days later and they developed cholera. This experience illustrates the necessity of examining more than once the stools of persons who have been in intimate contact with declared cholera. The case, however, shows a further point of great interest and importance. Just before the boy took ill, his step-sister, a child of two months, had been admitted to another hospital suffering from gastro-enteritis. She died there in a couple of days and neither during life nor at the autopsy was any suspicion of cholera aroused. The case of the boy, however, caused the authorities to examine the other children in this second hospital, and two children were found to be infected and carrying the vibrios. There can be little doubt that they had derived their infection from the step-sister, and that her gastro-enteritis was really cholera. The possibility that among the scores of cases of gastro-enteritis occurring in children every summer, some may be due to true cholera (and Gioseffi adduces another somewhat similar case) introduces a problem of great difficulty. It is impracticable to examine bacteriologically all these children and those with whom they have been in contact, and Gioseffi discusses the practical possibilities, which really amount only to a constant watchfulness, with the idea of cholera always borne in mind.

J. H. S.

AMAKO (T.) & KOJIMA (K.). **Komplementbindung bei Cholera und der Wert der Komplementbindungsmethode mit den Fäces für die rasche serologische Choleradiagnose.** [Complement-fixation in Cholera, and the Value for Rapid Diagnosis of the Faeces Fixation-method.]—*Zeitschr. f. Chemotherapie.* Orig. 1912. Vol. 1. No. 1. pp. 94-105.

Using as antigen a distilled water extract made from three or four strains of cholera grown on agar, Amako and Kojima obtained complement-binding with patients' serums during the

last epidemic at Kobe, Japan, *viz.* with five out of seventeen carriers, with fifteen out of 34 mild cases of the disease, and with twenty out of 28 cases of moderate to great severity. In two cases of the fulminant type and in three cases of typhoid-cholera no reaction was obtained. The agglutinating power of the serums frequently but not invariably corresponded with their complement-binding power. Different strains of cholera vary in their capacity to fix complement, and it is advisable to make the extract from three or four strains of known activity.

In typical cases, where the stool is of the characteristic rice-water appearance, it contains enough antigen to give a complement-binding reaction with an immune serum (best made from a rabbit and polyvalent). The stool is simply centrifuged, and the clear supernatant fluid used direct, and by this means a definite diagnosis can be made in seven to eight hours. The more typical the stool, the higher its antigen-content. In cases where the stool is atypical and contains few vibrios, the supernatant fluid may contain little or no demonstrable antigen. In such cases, if a peptone-water culture is made, in six to ten hours the upper layers are commonly swarming with vibrios and give excellent complement-fixation. The diagnosis can thus be effected in thirteen to seventeen hours. Occasionally there is little or no multiplication of the vibrios in the peptone water, and the reaction is negative, but in most cases where subsequent bacteriological examination demonstrates cholera, a diagnosis can be established many hours sooner than is otherwise possible.

[No evidence of the specificity of the reaction is given in this paper.]

J. H. S.

TREATMENT.

MEGAW (J. W. D.). **Note on Major Leonard Rogers's Method of Treatment of Asiatic Cholera.**—*Lancet.* 1912. Nov. 23. pp. 1424-1425.

For nine months in 1911 Megaw had charge of the cholera ward in the Medical College Hospital in Calcutta, and during that period ROGERS' method of injecting hypertonic saline and oral administration of permanganate was the treatment employed for severe cases. The usual case mortality in this hospital over a series of years has been about 60 per cent.; but in 112 cases treated during the nine months the mortality was 32·1 per cent., and 37·2 per cent. in the 94 of these which were severe enough to require transfusion. Some part of the improvement may possibly be due to improved nursing and care of the patients, but as is pointed out by Megaw, who has had previous experience in the same hospital, this can only account for a small proportion of the increase in the recoveries. No mild cases are included in the above figures, unless the cholera vibrio was definitely found. Megaw believes that transfusion should be practised early in the disease without waiting for a fall in blood-pressure.

J. H. S.

Lang (G.). Ueber den arteriellen Druck bei der Cholera asiatica, und seine Veränderungen unter dem Einflusse grosser Kochsalzinfusionen. [Arterial Pressure in Cholera and the Effect of Large Injections of Salt Solution.]—*Deut. Arch. f. Klin. Med.* 1912. Oct. 23. Vol. 108. Nos. 3-4. pp. 236-254. With 1 curve.

During the 1909-1910 epidemic of cholera at St. Petersburg Lang made a systematic study in sixty cases of the effect which salt solution infusions produced on the arterial blood pressure in the 'algid' stage of the disease. A principal object of this study was to determine the optimum amount to be administered, for while there was general agreement as to the great clinical value of the injections as a whole, marked differences of opinion existed as to the dosage, some clinicians giving as much as eight litres at one infusion (one case got 34 litres in four days) and others recommending one to two litres only. The observations were made with the patient lying down, and both the maximal and minimal blood pressures were determined. The maximal was ascertained by three methods, *viz.* by Korotkoff's auscultatory method, by Riva Rocci's method and with v. Recklinghausen's apparatus, and the mean of these three observations was taken as the actual reading. The minimal was determined by the first and third methods, the mean of these two being taken as the actual reading. From the maximal and minimal values so determined a mean blood pressure value was calculated. The infusion was made intravenously, a needle being inserted into the vein without preliminary incision of the skin, and warm 0·75 per cent. NaCl solution was used. The rate of infusion varied from 300 to 22 cc. per minute in different cases, and the figures give no indication as to the influence which rate of injection may have. The pressure apparatus was adjusted and a reading taken; then the injection was begun and readings were taken from time to time as infusion proceeded, and subsequent readings were taken some hours after and on succeeding days.

Before injection was begun, *i.e.* in the collapsed state, the maximal blood pressure was found to be distinctly lower than normal, 139 cm. water pressure instead of 156. In some cases it was extremely low, *e.g.* 60, 90 and 95, but these figures were very exceptional. The minimal pressure on the other hand was raised by 20 cm., and in consequence the mean blood pressure was not far from the normal value. This result, which agrees with what has been found to hold good in animal experiments, illustrates the persistency with which the organism endeavours to maintain a constant mean blood pressure in all circumstances. As we should expect the great loss of water that has taken place to be accompanied by a reduction in the blood volume, this constancy is probably to be attributed to vascular contraction. In three cases a lowering of the mean pressure to fifty per cent. of the normal was observed and, as in other clinical conditions readings so low are found only shortly before death, Lang believes these cases would have died if no injection had been made. The pulse pressure in the 'algid' state was always low, averaging 36 instead of the normal 74.

As infusion proceeds, the maximal and minimal values tend to approach the normal. The maximal rises and the minimal falls, and this goes on until about two litres have been given, after which both recede again from the normal value. From this fact Lang argues that on the average two litres is the quantity which best replaces the loss of NaCl and of water in the vessels and tissues and is the optimum dosage to give. As further quantities are given, all the values except pulse pressure rise above the normal, and the pulse-frequency increases. This observation is not in accord with the experimental work which has been done on animals, and Lang attributes the difference to some change (probably injury to the kidney) produced in the human system by the cholera poison and preventing adequate vascular dilatation. Excessive dosage, then, would seem to involve increased work for the heart, although immediate signs of heart-strain, such as cyanosis, dyspnoea, etc. were never seen, even after the injection of eight litres at one time.

During the period following the collapsed stage, the pressure values were frequently raised, especially the minimal; and in definite typhoid-cholera this was even more frequently the case. In cases which ended fatally the pressure values were always lowered and the frequency of the pulse was raised at the end of the injection.

J. H. S.

UNCLASSED.

GREIG (E. D. W.). **Note on the Occurrence of the Cholera Vibrio in the Biliary Passages.**—*Lancet.* 1912. Nov. 23. pp. 1423-1424.

It is frequently stated that the cholera vibrio does not invade the gall-bladder, but in the examination of 271 fatal cases Greig found the organism in the bile 81 times. He here gives details of one such case. The patient came in with a severe attack through which he was successfully brought by intravenous injection of saline and the use of permanganate. He subsequently, however, developed deep and hurried breathing and eventually died of uraemia, 12 days after the acute attack was over. Post mortem, there were the general signs of acute toxaemia. Further, the gall-bladder was intensely inflamed, the mucosa necrotic and sloughing, with haemorrhages in the submucosa, and a pure culture of cholera was obtained from the bile. One lung was greatly congested with patches of consolidation, and in smears made from these were found organisms which appeared to be cholera vibrios. The caecum was intensely inflamed with small areas of superficial erosion. The author points out that this localisation of the organism in the gall-bladder may enable it to persist in the body for longer periods than in the intestine, and may have an important bearing on the question of carriers and on the measures to be taken for the prevention of the disease.

J. H. S.

POLLAK (Felix). **Ueber die Lebensdauer und Entwicklungsfähigkeit von Choleravibrionen auf Obst und Gemüse.** [The Capacity of Cholera to Live and Multiply on Fruit and Vegetables.]—*Centralbl. f. Bakt.* 1 Abt. Orig. 1912. Oct. 29. Vol. 66. No. 7. pp. 491-495.

The articles to be examined (oranges, lemons, apples, spinach, lettuce, chicory) were dipped into a moderately thick salt solution suspension of cholera vibrios, and then placed in tall covered glass cylinders. Of each kind some were kept in the room and some placed in the open air, and in both places some specimens were protected from the light. Samples were taken daily, and placed in peptone water and the cultures examined repeatedly at different times. Diffuse daylight was found to exert little influence. The important factor was moisture, and temperature, sunshine, wind and so on were of importance chiefly as they affected the rate of drying. The other main factor was the development of other bacteria, which outgrew the cholera. Of all kinds the viability was considerable. Thus on oranges cholera may remain alive for a week or more, on lemons for a fortnight, on apples even longer. The persistence on vegetables varied according to the facilities they presented for retaining their moisture, and also on the rate of putrefaction. Lettuce leaves, for example, remain moist in the ridges or inside the curled tips of young leaves for long periods, while remaining comparatively fresh. Twenty-nine days after inoculation cholera could still be recovered from lettuce, and possibly still longer as the limit was not determined. The conditions of these experiments are naturally very artificial, but the results emphasise the risks which may attend the sale or consumption of fruit and vegetables coming from cholera-infected quarters.

J. H. S.

SEGALE (M.). **Sul Contenuto in Glicogeno nel Fegato e nel Sangue dei Colerosi.** [The Glycogen Content of the Liver and Blood in Cholera.]—*Policlinico.* Sez. medica. 1912. Oct. Vol. 19. No. 10. pp. 441-445.

In six cases of cholera the author determined the quantity of glycogen detectable in the liver and the blood, removed from the body as soon as possible after death. In the blood none could be demonstrated, and in the liver only minimal traces in two cases, a result in agreement with what has been observed in other bacterial infections and intoxications. In three of these cases the blood was shown to have a distinctly diminished alkalinity. Segale points out that many of the conditions known to favour the disappearance of glycogen, such as reduced food-absorption, increased muscular work (cramps), acidity of the tissues and body-fluids, insufficiency of oxygen, fever, renal lesions, are present at the same time in an acute case of cholera.

J. H. S.

BITTROLFF (R.). **Zur Morphologie des Choleravibrio.** [Morphology of the Cholera Vibrio.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1912. Oct. 29. Vol. 66. No. 7. pp. 496-500.

In a number of guinea-pigs, into whose peritoneal cavities he injected cholera vibrios, Bittrolff noticed that the organisms underwent a peculiar change. Samples withdrawn by capillary pipette an hour later showed amongst the active and very numerous vibrios many which were feebly motile and as if swollen, also some spindle-shaped and starfish-like branching structures and a limited number of rapidly moving ball-like bodies. In the next three to four hours the vibrios became relatively fewer and there was an increased number of motile balls of larger size. After six hours one saw only these balls, now quite large and many of them showing at one side buds in the manner of yeast cells. The animals died some ten to twenty hours after the injections, and plates made from the peritoneal exudate showed only normal vibrios, while in portions of the exudate allowed to stand at 37° the balls gradually disappeared and normal vibrios succeeded. The abnormal forms did not appear in fresh serum inoculated with the organism, but if he withdrew some of the exudate an hour after injection and incubated it at 37° remarkable aberrant forms developed, some of them trypanosome-like flagellate bodies, as well as the large balls already described. These all stained intensely with dilute carbol fuchsin. The phenomenon occurred only with the one strain of cholera, three others failing to show any such abnormalities. In one per cent. peptone water with one per cent. or five per cent. NaCl added no obnormal forms appeared, but with 0·5 per cent. NaCl somewhat similar appearances but mostly non-motile were seen after twenty hours culture. Bittrolff thinks they are not involution forms in any sense of the word, which implies degeneration or approaching death.

J. H. S.

SCIALOM. **Le Choléra de 1911 en Tunisie. L'Épidemie de Choléra de l'Été 1911 en Tunisie.**—*Rev. de Méd. et d'Hyg. Trop.* 1912. Vol. 9. No. 2. pp. 119-123.

Remarks on ten cases, with some observations on the attitude towards hygienic measures of the various races to be met in Tunis, *e.g.*, Jews, Mussulmans, Europeans.

J. H. S.

PLAGUE.

STUDIES ON PNEUMONIC PLAGUE.

STRONG (R. P.). **Studies on Pneumonic Plague and Plague Immunization. i. Introduction. The Expedition to Manchuria and the Conditions under which the Work was performed there.**—*Philippine Jl. of Science.* Sec. B. [*Philippine Jl. of Trop. Med.*] 1912. June. Vol. 7. No. 3. pp. 131-136.

During the winter 1910-1911 Manchuria was ravaged by an epidemic of pneumonic plague. STRONG and TEAGUE were despatched by the War Department, Washington, and the American Red Cross Society, from Manila to Mukden in Manchuria, where they arrived on March 1st, 1911. The outbreak was then at its height. Strong and Teague immediately began work in an old temple which had been converted into a plague hospital. The difficulties which they encountered were great. The patients were crowded together indiscriminately side by side on wooden platforms, wearing the clothing in which they were brought to hospital. They were left without attention, so great was the fear of infection which existed among the attendants, since many of the staff had died of plague earlier in the course of the epidemic. The author's first task was to separate the plague from other patients. There was no water supply, no gas, nor proper heating arrangements. They used alcohol blast lamps and Primus burners for laboratory purposes.

C. Birt.

STRONG (R. P.) & TEAGUE (O.). ii. **The Method of Transmission of the Infection in Pneumonic Plague and Manner of Spread of the Disease during the Epidemic.**—*Ibid.* pp. 137-156.

FLUEGGE and his pupils showed that tubercle bacilli were present in the droplets of sputum ejected by 40 per cent. of phthisical patients in the act of coughing. It appeared probable to the authors that the *B. pestis* is disseminated in a similar manner by those suffering from pneumonic plague. They exposed 82 agar plates at distances varying from 5 centimetres to 2 metres in front of the faces of pneumonic plague patients for a period of two minutes. In 39 instances the patient did not cough; only one of these plates yielded growths of the plague bacillus. 35 times the patient coughed while the plate was uncovered; the *B. pestis* was found on fifteen. Frequently during coughing, visible particles of sputum were expelled. If these alighted on the plate, the growths which resulted were not included in the records of these experiments, the object of which was to investigate the invisible spray. The results were negative when four plates were uncovered while the patient was talking, and when eight plates were exposed in the wards in the vicinity of pneumonic cases.

Guinea-pigs, the abdomens of which had been shaved and scarified, were placed before the mouths of three patients at a distance of 5 centimetres for two minutes. The animals did not develop plague.

The authors summarise their conclusions thus—

"1. During normal and dyspnoeic respiration of primary pneumonic-plague cases, plague bacilli are not usually expelled by means of the expired air.

"2. During coughing of such cases, even when sputum visible to the naked eye is not expelled, plague bacilli in large numbers may become disseminated into the air surrounding the patient.

"The idea that infection of doctors, nurses, attendants, &c., in plague hospitals is caused entirely by particles of sputum expectorated by the patient and visible to the naked eye is erroneous. It follows from these experiments that the wearing of masks and the proper covering of any surface of the skin where fresh abrasions are present are important, personal, prophylactic measures against plague infection. It also follows that the eyes should be protected against this manner of conjunctival infection by proper glasses.

"Articles of clothing worn in the wards should be sterilized immediately after removal, since plague bacilli may be present even though no particles of sputum may be visible upon them.

"From these experiments, also, it is evident how dangerous an infective agent a pneumonic-plague patient is. In no other disease is the individual so dangerous, and in no other disease does the danger from droplet infection approach that which exists in pneumonic plague. The number of plague bacilli expelled in droplets from pneumonic-plague cases is probably far greater than the number of bacilli ever expelled by patients afflicted with tuberculosis, croupous pneumonia, diphtheria, or influenza.'

"During the epidemic the disease was evidently spread directly from man to man by droplet infection and by the more or less intimate contact of healthy individuals with an infected person. Whatever may have been the primary source of the epidemic, its dissemination occurred entirely independently of tarbagans, rats, donkeys, or any other animals.

"The disease was introduced into uninfected villages and towns by the importation of individuals infected with pneumonic plague, or by those in the incubation period of this disease. No definite bacteriological evidence, that healthy carriers of the disease with plague bacilli in their sputa existed during the epidemic, has been produced. We had opportunity to examine two healthy individuals who were supposed to have given rise to the disease in other persons but who themselves remained healthy. We were unable to demonstrate any plague bacilli in their sputum, and it was not infective for guinea pigs."

C. B.

TEAGUE (O.) & BARBER (M. A.). iii. **Influence of Atmospheric Temperature upon the Spread of Pneumonic Plague.**—*Ibid.* pp. 157-172.

Comparative experiments were undertaken to ascertain the effects of drying on bacteria. Emulsions of plague, cholera, *B. prodigiosus*, and sarcina organisms were spread on slides and exposed at an air temperature of 32° to 34° C., the dry-bulb thermometer being five degrees higher than the wet. The cholera vibrio was destroyed in one minute, *B. pestis* in five minutes, *B. prodigiosus* in one hour, and the sarcina in six hours. When these emulsions were sprayed into air, the temperature of which was 30° C., the difference between wet and dry bulbs being 1·8° C., cholera vibrios survived six minutes, *B. prodigiosus* twenty minutes, and the sarcina more than three hours. On account of the risk to the experimenters the plague emulsion was not thus tested, but it is probable that twenty minutes would have been the limit of its vitality. The experiments were repeated in an atmosphere saturated with moisture. The cholera organism lived for twenty-seven minutes; *B. prodigiosus* for more than two hours; and the sarcina for more than three and a half hours. Experiments also showed that *B. prodigiosus* resists death by drying longer at low temperatures than at high, although the rate of drying is the same in both instances. It seems reasonable to infer that the plague bacillus conveyed in the fine droplets of sputum would perish rapidly in a hot and dry atmosphere, but that it would retain its vitality for an hour or more when the air is cold and laden with moisture.

During the course of the epidemic at Harbin, the temperature ranged between −9° C. and −32° C. and the water deficit in the air was represented by about 0·3mm. of mercury. On the other hand in India, with a temperature of 30° C., the water deficit would be represented by about 9·5mm. of mercury; hence evaporation would take place thirty times more rapidly in India than in Harbin. Furthermore, the air of the densely overcrowded and unventilated dwellings of the inhabitants of Harbin was saturated with the moisture of the breath of the occupants. In Manchuria, then, every condition was present which was favourable for the survival of the plague bacillus in the particles of sputum ejected in the air by the act of coughing of the plague-stricken patients. In the winter of the year 1903, there was an outbreak of pneumonic plague in Kashmir which caused 1,400 deaths. Here the circumstances were similar to those in Manchuria. In the plains of India, however, where millions of cases of plague have occurred during the last 15 years, about 3 per cent. of which have been pneumonic, this type of the infection has never assumed epidemic proportions.

C. B.

Strong (R. P.) & Teague (O.). iv. **Portal of Entry of Infection and Method of Development of the Lesions in Pneumonic and Primary Septicaemic Plague: Experimental Pathology.**—*Ibid.* pp. 173-180.

Suspensions of virulent plague cultures were sprayed for two or three minutes into closed glass cages in which animals were confined. 34 guinea-pigs and 55 monkeys died of plague induced in this manner. The portal of invasion in the guinea-pig was the mucous membrane of the mouth and throat, for there was much oedema of the subcutaneous tissues of the neck; the cervical lymph glands were swollen and contained haemorrhages, and general septicaemia supervened with changes similar to those seen after subcutaneous inoculation. Pneumonia was present in 23 per cent. of the guinea-pigs only, and was probably secondary to the blood infection. In the monkeys, on the other hand, the *B. pestis* entered through the smaller bronchi; for in none of the animals was there swelling of the cervical glands and tissues. Lobular pneumonia was the earliest lesion found, extending to whole lobes of the lungs in more advanced stages. At the outset the plague bacilli were most numerous in the bronchioles, peribronchial spaces, and alveoli of the lungs, and were in smaller numbers or not at all in the blood. Six monkeys were infected by touching the back of the pharynx with a rod which had been dipped in a culture of virulent plague. These animals died of plague septicaemia, with cervical buboes and oedema in most. The lungs were not pneumonic. The authors conclude that infection in epidemic plague pneumonia results from inhalation of the *B. pestis* into the bronchi. The blood, which is free from these organisms at the onset, is soon invaded. In exceptional cases, the avenue of entrance may be through the mucous membrane of the mouth or throat; primary septicaemia then ensues. Some such instances were observed during the Manchurian outbreak, in which death took place before the lungs or glands showed any change.

C. B.

STRONG (R. P.) & TEAGUE (O.). v. **Clinical Observations.**—*Ibid.* pp. 181-185.

The epidemic, which caused the death of 50,000 people, was almost entirely of the pneumonic type; only two or three bubonic infections were reported. FUJINAMI reported a case in which the haemorrhagic enlargement of the lymphatic glands of the neck and the oedema of the neighbouring tissues suggested that the tonsils, or the mucous membranes of the mouth or throat, were the portals of entry. The incubation period was two to five days, usually two or three. The onset was sudden, but definite rigors did not occur. With the customary symptoms of fever the temperature rose to 103°-104° F., and the pulse to 110-130 in 24 hours. Cough and dyspnoea came on during the first day. The sputum soon became blood-stained and thin, and never resembled the rusty viscid expectoration of croupous pneumonia. The signs in the chest were often but slightly marked; feeble respiratory sounds with tubular breathing over small areas were as a rule all the indications that were noted. Heart failure was always pronounced. The lymphatic glands were not enlarged; petechiae on the skin were seldom seen; melaena was observed occasionally. The duration of the disease was three days, rarely four; no case survived a week. The diagnosis was made by microscopical examination of the sputum, and by culture of the sputum and blood. The prognosis was bad; no case recovered. Treatment was ineffective; anti-pest serum appeared to defer the fatal event for a short time in a few cases.

C. B.

STRONG (R. P.) & TEAGUE (OS.). vi. **Bacteriology.**—*Ibid.* pp. 187-202.

The bacillus isolated from the Manchurian pneumonic plague cases resembles the organism of bubonic plague. Besides the normal bipolar rods, involution forms are found in preparations of the sputum or post-mortem material. These appear as long, thick, deeply staining rods or rings. When the organism is grown on 3 per cent. salt agar the characteristic bizarre shapes are obtained. When the Manchurian strain is planted on ordinary agar, small dew-drop-like colonies arise after 24 hours' incubation at 25° to 35° C. Sometimes two types of colonies are seen on the same agar surface, the one smaller and more translucent, the other larger and more opaque. At 37° C. there is considerable production of mucus, which is less when the bacillus is cultivated at 30° C. and still less when its cultures are developed in the ice-chest. Freshly isolated strains give rise to a larger production of mucus than do old laboratory growths. The virulence of the Manchurian bacillus is not greater than that of the organism derived from other sources. It retained this property throughout the epidemic, the sudden cessation of which cannot be attributed to a diminution in the pathogenic action of the microbe.

The authors obtained an agglutinating serum by inoculating rabbits with living avirulent plague cultures, which were more effective than killed virulent emulsions. They employ the serum for the identification of suspected micro-organisms. The chief difficulty arises from the great tendency of the *B. pestis* to become auto-agglutinable. Old cultures clump spontaneously, or in the presence of normal serum. This difficulty can be overcome by cultivating at 37° C. A strain which is self-clumping in growths incubated at 12° C. and 32° C. may give a reliable emulsion if the incubation has been conducted at 37° C. The agglutination test has no clinical value, for the patient succumbs to the plague pneumonia before agglutinins are elaborated. For diagnostic purposes the examination of the sputum is essential. When the sputum has become blood-stained the microbe is present in enormous numbers in almost pure culture. Earlier in the course of the malady it may escape detection by the microscope but is found by culture. The rods occur in such large numbers in the blood that they may be seen in stained blood films in many cases. 1 cubic centimeter of blood is introduced into broth if the examination is made at the onset of the infection when the bacteria are less numerous. In cases where no necropsy is allowed, a hypodermic syringe may be used to puncture the lung.

C. B.

Strong (R. P.), Crowell (B. C.), & Teague (O.). vii. **Pathology.**—*Ibid.* pp. 203-221.

The authors base their report on 25 necropsies. The superficial lymphatic glands were not enlarged. There were neither buboes, carbuncles, nor skin eruptions. In the anterior mediastinum there were oedema and haemorrhages, and beneath both surfaces of the pericardium petechiae were seen in many cases. Ecchymoses also were numerous beneath the parietal and visceral layers of the pleura. In two instances the pleural cavity contained 100 and 200 cc. of blood-stained serum in which the plague bacillus was present. Recent fibrinous adhesions overlay the pneumonic areas. If death took place within 24 or 48 hours of the invasion, the infected lung was larger, firmer, and less crepitant than the normal viscus. On section it was deeply congested and oedematous, sometimes of almost jelly-like consistence. Later, pneumonic consolidation set in, first of the lobules, then of the lobes. The areas affected were not so extensive as those seen in croupous pneumonia. Except in a few instances death occurred before the stage of grey hepatization was reached. The bronchi contained blood-stained serum, and their mucous membrane was always deeply injected. The bronchial glands were swollen from congestion and haemorrhages. The chief feature on microscopical examination was the vast number of plague bacilli in the bronchioles, peribronchial spaces, alveoli, and finally in the blood vessels. The presence of fibrin in the alveolar exudate was unusual; hence plague pneumonia differs from the pneumococcus infection in this respect. The spleen was enlarged in half the cases. Small haemorrhages were present in its substance, in the kidneys, in the liver, and occasionally in the coats of the small intestine. The authors conclude—

> "From the study of the human lesions and those produced experimentally in animals, it would appear that epidemic plague pneumonia results from inhalation, the primary point of infection being the bronchi. Along the bronchioles the infection extends by continuity directly into the infundibulum and air cells, or by contiguity through the walls of the bronchioles to the contiguous tissue of the lung, and gives rise to a consecutive peribronchial inflammation in the tissues immediately surrounding the bronchioles. From these areas the infection rapidly spreads to the adjacent pulmonary tissue and visceral pleura. The bacilli rapidly multiply and produce at first pneumonic changes of the lobular type, and shortly afterwards from the fusion of several rapidly spreading areas more general lobar involvement of the lung tissue. The blood becomes quickly infected, and a true bacteraemia results in every case. Secondary pathological changes occur, particularly in the spleen, bronchial glands, heart, blood vessels, kidneys, and liver. The fact that the bronchial glands at the bifurcation of the trachea are always much more severely affected than any of the other lymphatic glands argues against the theory that epidemic pneumonic plague is primarily a septicaemic disease, and that the lungs are infected secondarily from the blood. Moreover, in the earliest stage of the disease, the blood may be free from plague bacilli. The conditions observed in the trachea and bronchi in epidemic plague pneumonia, together with the character of the pulmonary exudate, is pathognomonic of this condition. From the appearance of the mucous membranes of the throat, larynx, and trachea, a diagnosis of pneumonic plague may sometimes be suggested. The tonsils may become secondarily infected just as other lymphatic glands—for example, the bronchial ones—become so infected. However, in pneumonic plague, death occurs before any very marked macroscopic changes occur in the tonsils. There is no doubt also that the tonsils may become primarily infected in epidemics of pneumonic plague, just as has occurred in sporadic cases during epidemics of bubonic plague. This, however, is not the common channel of primary infection, and in such cases involvement of the lymphatic glands of the neck occurs early in the course of the disease. The fact that the oesophagus was found to be normal in every case examined, and that the intestines showed only slight lesions, constitutes another argument against the idea of the occurrence of primary intestinal plague infection in man, since in many of the pneumonic cases plague bacilli must have been repeatedly swallowed in the bronchial secretions and in the saliva."

C. B.

STRONG (R. P.) & TEAGUE (O.). viii. **Susceptibility of Animals to Pneumonic Plague.**—*Ibid.* pp. 223-228.

The virulence of the Manchurian plague bacillus was similar to that of bubonic cultures when tested on mice, rats, guinea-pigs and monkeys (*Cynomolgus philippinensis*). Moreover, when the pneumonic plague organism was introduced by scarification of the skin, or by subcutaneous injection, the animals died of bubonic plague. The cutaneous or subcutaneous inoculation of the marmot or tarabagan, *Arctomys* *bobac*, with virulent cultures of the pneumonic strain gives rise to an acute bubonic or to subacute or chronic forms of plague infection. PETRIE found that the tarabagan harbours a flea, *Ceratophyllus silantievi*, which bites man. TIRABOSCHI and D-KOLBASENKO also discovered fleas on this animal in Russia. The *B. pestis* is pathogenic to another species of marmot common at Mukden, the *Spermophilus citillus*; after skin inoculation with pneumonic plague it dies in three to seven days of the bubonic form of the disease. The authors were unable to infect five donkeys by spraying suspensions of virulent pneumonic plague cultures into sacks in which their heads were confined.

TAKAMI reported to the Mukden Conference that he discovered pneumonic plague in a dog which belonged to a house where seven people had died of this malady. The authors induced pneumonic plague in two dogs by spraying. They died in 5 and 17 days.

C. B.

STRONG (R. P.) & TEAGUE (O.). ix. **Protective Inoculation against Pneumonic Plague.**—*Ibid.* pp. 229-243: and with less detail in *Far Eastern Assoc. Trop. Med.*: *Trans. Second Biennial Congress held at Hongkong*, 1912. pp. 117-127.

132 persons were inoculated with killed plague cultures at Harbin: 22 of these contracted plague, 13 after one injection, 8 after two, and 1 after three injections. Of the 8 who fell ill after two inoculations, in 2 the onset came on in six days, in 2 in ten days, in 1 in twelve, and in 1 twenty-seven days after the injection. Of the 13 who contracted plague after one inoculation, 12 became ill after 14 days, and one after six days. Dr. WU reported two deaths from pneumonic plague in twenty-two people who had been inoculated. At Fuchiatien 439 persons were inoculated with Haffkine's vaccine and with antiplague serum. Sixteen, who received two injections of the vaccine and one of serum, remained healthy. Thirty, to whom were given two injections of the vaccine, or vaccine and serum, also escaped the infection. Of 393 people who were vaccinated once with Haffkine's prophylactic, 4 died of plague, 1 eight, 1 ten, 1 eighteen, and 1 thirty-two days after inoculation. 14,000 individuals approximately were in inoculated with plague vaccine; the incidence of plague on them is not given by the authors; they state that the great majority was not exposed to plague, but that some who had been inoculated more than once were attacked.

The authors immunized guinea-pigs and monkeys with living cultures of attenuated plague bacilli, for Strong had shown that 80 per cent. of guinea-pigs and 61 per cent. of monkeys were thus protected against skin or subcutaneous inoculation with virulent plague bacilli, whereas the injection of killed cultures afforded protection to 26 per cent. of the guinea-pigs only.

For the purpose of testing the immunity of animals against pneumonic plague virus, 48 hour agar cultures of the most virulent pneumonic strains were suspended in saline fluid which was sprayed for two minutes in the closed glass cages in which the animals were confined. The experimenter shielded himself during the process by the use of rubber gloves, mask, and goggles. Eleven guinea-pigs were vaccinated with 48 hour living cultures of the avirulent bacillus: nineteen days later these animals and 12 controls were exposed to infection by inhalation. 8, or 73 per cent., of the vaccinated guinea pigs survived; all the controls died. In a second experiment, 23 guinea pigs were inoculated with the living attenuated cultures, and 15 days afterwards they and 24 controls were exposed by inhalation. 16, or 70 per cent. of the vaccinated animals lived; all the controls except one died. The avenue of infection in the guinea-pigs which died was the mucous membrane of the mouth or throat, and was not the lung, for there were oedema of the neck, enlargement of the cervical glands, and signs of general infection in all: pneumonia was found in 24 per cent. only.

The investigations on monkeys were much more instructive. Each of eleven monkeys was inoculated with a 48-hour living agar culture of the avirulent plague bacillus; 19 days later these and twelve normal monkeys were exposed to infection by inhalation. Only one of the vaccinated animals lived; all the rest and the controls died of pneumonic plague. In another experiment nine of 22 vaccinated monkeys, and four of 22 normal monkeys survived. In a third test only two of 21 vaccinated monkeys lived. The remainder and 21 controls died of plague pneumonia. Hence prophylactic inoculation with living attenuated virus does not afford the same protection against pneumonic plague as it does against bubonic plague in animals. It would seem that the use of masks is the only reliable method of protection against pneumonic plague.

C. B.

BARBER (M. A.). x. **Immunization of Guinea Pigs by Vaccination with Avirulent Plague Bacilli mixed with Agar.**—*Philippine Jl., loc. cit.* pp. 245-247.

Thirty-four guinea-pigs were inoculated with living avirulent plague cultures incorporated with agar. Only twelve survived when their immunity was tested. The use of the culture alone gives better results.

C. B.

BARBER (M. A.). xi. **The Infection of Guinea Pigs, Monkeys, and Rats with Doses of Plague Bacilli, ranging from one Bacillus upwards.**—*Ibid.* pp. 251-254: and *Far Eastern Assoc. Trop. Med.: Trans. Second Biennial Congress held at Hongkong,* 1912. pp. 127-130.

The author has described his ingenious method of manipulating a single bacillus in papers which were published in the *Journal of Infectious Diseases* for the years 1906, 1907, and 1911. A glass pipette, the end of which is drawn into a microscopically fine point, is attached in a holder to the stage of the microscope. The fine point, bent upwards at right angles, is raised into a hanging drop which contains the micro-organism; both must be in the field of the microscope at the same time. The bacillus enters the point of the pipette, and so can be readily transported, blown out, and inoculated. In his experiments with plague bacilli, doses of 50 or less were counted. The Thoma-Zeiss counter was used for estimating larger numbers.

The percentage of fatal infections which occurred in guinea pigs receiving one plague bacillus was nearly the same as that after doses of 500. Between 60 and 70 per cent. died. The Shanghai strain of plague was rather less virulent, though five bacilli were fatal. In no case in which plague was induced by doses of less than 50 bacilli did the animal recover. The number of guinea pigs which were inoculated with from one to five hundred virulent plague bacilli was 36, of which 24 died. Of 13 guinea pigs inoculated with from one to five hundred Shanghai plague bacilli, six were infected, but three only died. Two out of twelve monkeys, which were inoculated with one bacillus each, died. Of 31 monkeys which received subcutaneously from one to five hundred virulent plague bacilli, six were infected and died. 4 out of 14 wild gray rats which had been inoculated with from one to one hundred plague bacilli died. In two instances three and four bacilli were sufficient to excite a fatal effect. The infected animals which had been infected with small doses survived nearly twice as long as those inoculated with a million plague rods. Therefore, the author concludes, the smallest possible dose of virulent plague bacilli can infect guinea pigs, monkeys, and rats.

C. B.

Barber (M. A.) & Teague (O.). xii. **Some Experiments to Determine the Efficacy of Various Masks for Protection against Pneumonic Plague.**—*Philippine Jl., loc. cit.* pp. 255-268.

The danger of coming into the near vicinity of a sufferer from pneumonic plague is very great; 69 of the 150 men who were employed in ambulance parties at Fuchiatien, the native city near Harbin, fell victims. There were 297 deaths among the plague staff of that city, who numbered 2,943.

The mask which was worn at Mukden consisted of a pad of absorbent cotton about 16 by 12 centimetres in area, and about 1·5 thick; this was wrapped in gauze, the ends of which were tied at the back of the head. A many-tailed bandage composed of three layers of gauze with holes for the eyes was tied around the entire head and served to press the mask firmly against the face and to keep it snugly in place for hours at a time. Though irksome at first, with use it became possible to wear it for several hours without removal, which however always gave the feeling of intense relief.

At the Mukden Conference Broquet exhibited a mask, copied from figures in old books of those used by doctors during the fourteenth century. It consisted of a hood of light canvas or khaki cloth, covering the entire head and drawn in at the neck. In front was a window of mica. It was found that a hood of heavy Canton flannel with a nap was more effective than the thinner material used by Broquet. A sheet of celloidin was substituted for the mica. The hood was made narrow at the neck so that it could spread out over the shoulders and could be drawn in around the neck. The efficacy of the masks was tested by directing a powerful spray of a *B. prodigiosus* emulsion against the face of the wearer for three minutes. In 42 experiments the Mukden mask held back the *B. prodigiosus* 6 times only. The Canton flannel Broquet mask obstructed the entrance of this bacillus 10 times in 17 tests. The authors state that, although masks hold back many bacteria that would otherwise pass into the mouth and nostrils, nevertheless their use during the recent epidemic of pneumonic plague lent a false sense of security, which may have led to the taking of unnecessary risks. They believe that their experiments fully justify the conclusion that masks such as were used in that epidemic do not offer an absolute protection against pneumonic plague. Strong's remarks on this subject are valuable. Describing the conditions of work in the plague hospital, he states that the strictest personal precautions were observed. They never entered the wards unless protected by the Mukden mask, goggles, rubber gloves, and cotton uniform. Although they worked there for several hours each day, giving intravenous injections, leaning over coughing patients, exposing agar plates before them, making physical examinations, etc., they remained entirely healthy. He thinks that this test indicates the practical use of the Mukden mask, and suggests that the explanation may be found in the size of the droplets of pneumonic sputum compared with the very fine spray produced by means of a power pump atomizing a saline fluid emulsion of bacteria. He quotes Heymann, who ascertained that the smallest droplets emitted by coughing phthisical patients are not less than 30 micromillimetres in diameter.

C. B.

TROPICAL DISEASES OF THE SKIN.

LEGENDRE & LUCAS. **Un Nouveau Cas de Blastomycose Cutanée Humaine.**—*Bull Soc. Méd.-Chirurg. de l'Indochine.* 1912. July. Vol. 3. No. 7. pp. 451-455.

The authors describe a case of blastomycosis, the second observed in French Indochina. The patient, a man of 38, presented indolent patches of a tubercular appearance with numerous small ulcers covered by crusts on the alae nasi and the septum. A few pustular lesions were present on the face. Anti-syphilitic treatment by means of intramuscular injections of biniodide of mercury had no effect. The patient was then seen by one of the authors (Legendre), who diagnosed blastomycosis. A microscopical examination revealed the presence of yeast-like cells similar to the blastomyces described by Legendre in the first case. Cultural experiments were not carried out. Potassium iodide in large doses caused a complete cure of all the lesions.

[Blastomycosis is extremely common in several parts of the Tropics, numerous cases having been observed in Brazil by SPLENDORE, LUTZ, etc., in the Philippine Islands by PHALEN and NICHOLS, and in Ceylon by the reviewer.]

Aldo Castellani.

CASTELLANI (Aldo). **Observations on some Tropical Dermatomycoses.**—*Proc. Roy. Soc. Med.* (Dermatol. Sect.) 1912. Dec. Vol. 6. No. 2.

The author calls attention to the frequency and importance of dermatomycoses in the tropics, some of which are the same as in temperate zones, while others are peculiar to the tropics. He recapitulates the results of his investigations on the following: Tinea cruris, Tinea capitis tropicalis, Intertrigo saccharomycetica, Tinea flava and nigra, Tinea imbricata.

Tinea cruris has been known to tropical practitioners for many years under the name of dhobie itch. In 1905 the author stated that it should be separated from the ordinary forms of tinea corporis, and MACLEOD suggested the name tinea cruris, For the fungus most commonly found in such cases, characterised by the peculiar yellowish colour of its colonies, the author used the term *Trichopyton cruris.* In 1907 SABOURAUD investigated very completely the condition in France which he called tinea inguinalis. There can be no doubt that this is the dhobie itch of tropical authors, or tinea cruris. SABOURAUD and PINOY having examined the author's cultures have come to the conclusion that *Epidermophyton inguinalis* and *Ep. cruris* are the same fungus. *Ep. cruris,* though most frequently observed in tinea cruris, is not the only fungus which can give rise to this condition; tinea cruris may be caused by several species of fungus, each of which gives rise to a slightly different variety of the disease. Up to the present the author has observed the following organisms: *Ep. cruris; Ep. perneti; Ep. rubrum; Trichophyton nodoformans.*

Epidermophyton cruris Cast. 1905, syn: *Ep. inguinalis* Sabouraud 1907, *Tr. castellanii* Brooke 1908—causes the commonest and best known type of the disease as described by all tropical authors, and in Europe by SABOURAUD. It is characterised by large festooned patches with elevated margins on the scrotum, perineum, and inner surface of the thighs. As already stated by the author (*British Journal of Dermatology* 1910) it is an error to consider tinea cruris as always localised to the groin and armpits; in many cases it spreads to other parts of the body (excepting only the scalp); it may start on the chest and arms and spread to the groin and armpits or it may even not affect these regions at all.

Epidermophyton perneti Cast 1907.—Was discovered by PERNET. Somewhat resembles *Ep. cruris*, but grows faster on maltose agar and the cultures have at first a delicate pinkish colour.

Epidermophyton rubrum Cast. 1909, syn: *Ep. purpureum* Bang 1911.—This fungus is characterized by the beautiful deep-red pigmentation in Sabouraud and glucose agar. It induces a type of dhobie itch which has a great tendency to spread from the groins and axillae to other parts of the body. The eruption has often an eczematoid appearance.

Trichophyton nodoformans Cast. 1911, is characterised by the peculiar brick-red colour of the cultures on Sabouraud's agar: this colour is lost in subcultures. It induces a peculiar type of dhobie itch with deep nodules along the edge of the eruption.

Tinea capitis tropicalis.—This form is comparatively rare in Ceylon. All the cases seen by the author were of the same type and due to the same Trichophyton: the scalp presented in all cases numerous white patches covered by an enormous number of pityriasic whitish squamae. The patches remain bald permanently. The fungus is *Trichophyton endo-ectothrix*, practically identical with *T. violaceum* of SABOURAUD.

Intertrigo saccharomycetica.—The affection is apparently rare. It was described in Ceylon by the author several years ago. It generally attacks the scroto-crural and axillary regions. The affected skin is red and there may be slight exudation. The borders of the eruption are fairly well marked but never elevated. In most cases there is little itching and the condition may recover spontaneously. In scrapings a Saccharomyces-like fungus (*S. samboni* Cast. 1907) is found which is easily cultivated on sugar media. According to recent researches, however, the fungus may have to be placed in the genus *Monilia.*

Tinea flava.—This dermatomycosis is confused by several authors with the pityriasis versicolor of temperate zones, but the researches of JEANSELME and the author tend to prove that it is a separate entity. The disease, which is extremely common in Ceylon, is characterized by the presence of bright yellow patches found in various parts of the body. It is very difficult to cure. The fungus is a *Malassezia* (*M. tropica* Cast. 1905) which so far has not been grown.

Tinea nigra.—Was first described in 1872 by MANSON in China, but his observations were forgotten as they were not quoted by him in his subsequent publications; it was re-described in 1905 by the author in Ceylon. It is characterized by the presence of black patches due to a fungus belonging to a new genus, called by the author *Foxia*, the specific name being *Foxia mansoni* Cast. 1905.

Tinea Imbricata.—The etiology of this disease has been the subject of numerous controversies. In recent years the general opinion has been that aspergillus-like fungi are its real cause. The author, from the investigations he has made, considers the aspergilli and aspergillus-like fungi have nothing to do with the condition, and that when they are present, they are merely saprophytes or contaminations. By using a special technique he has succeeded in growing what he considers to be the true fungi causing the disease: they are not trichophytons; they resemble more the achorions, as justly remarked by SABOURAUD who has examined the cultures. They will probably have to be placed in a separate genus, for which the author suggests the term *Endodermophyton.* He believes that there are several species of endodermophytons; two have been so far isolated by him: *End. concentricum* and *End. indicum.*

On glucose agar (4 per cent.) *Endodermophyton concentricum* shows a growth with cerebriform or crinkled surface of an amber colour; in young culture duvet is generally absent. On the same medium *Endodermophyton indicum* shows a growth somewhat convoluted; the central portion is generally of a deep orange, red-orange, or pink-orange colour, the rest of the growth appearing white and powdery, being covered by a very short white delicate duvet. The author has reproduced the disease in man by inoculating pure cultures of both fungi.

A. C.

CASTELLANI (Aldo). **Further Researches on Trichomycosis flava, rubra, et nigra of the Axillary Regions.**—*Proc. Roy. Soc. Med.* (Dermatol. Sect.) 1912. Dec. Vol. 6. No. 2.

The affected hairs present nodular formations, plainly visible to the naked eye, of rather soft consistency, easily removable by scraping with a triangular needle or any similar instrument. The formations are either yellow or black or, less frequently, red; they may be very abundant and form a yellow or black or red sheath round the hair. By the use of the microscope these nodules are seen to consist—in the yellow variety—of enormous numbers of bacillary-like bodies imbedded in an amorphous cementing substance; in the red and black varieties large groups of cocci are observed as well.

According to the author's researches the yellow variety is due to a *Nocardia* (*N. tenuis*), the mycelial segments of which being very thin have a bacillary appearance. He has not succeeded in growing the fungus. The black variety is due to a symbiosis between the same *Nocardia* and a black pigment producing coccus which he describes under the name of *Micrococcus nigrescens.* The red variety is caused by a symbiosis between the same *Nocardia* and a red pigment producing coccus.

Diagnosis.—The condition must be differentiated from the various forms of trichosporosis (piedra etc.) and from leptothrix of temperate climates. It is easily distinguished from the former by the fact that *Nocardia tenuis*, in contrast to the various species of Trichosporum, is an extremely thin fungus; it differs from the latter by the nodules being soft, easily removed, and by the hairs not becoming brittle; moreover it is easily curable.

Treatment.—The author recommends dabbing the hair two or three times daily with a solution of formalin in spirit (ʒ i to ℥ vi) and applying a sulphur ointment at night.

A. C.

THIROUX (A.) & PELLETIER (J.). **Mycétome à Grains Rouges de la Paroi Thoracique. Isolement et Culture d'une Nouvelle** *Oospora* **Pathogène.**—*Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 585-589.

The authors state that the variety of mycetoma characterised by the presence of red granules is common in Senegal. A case is described in detail in which this mycosis developed on the right side of the thorax. The affected region presented several sinuses from which a purulent liquid exuded containing minute red granules. Apparently the disease had attacked the lungs also, zones of dulness being detected by percussion and the patient spitting up purulent matter containing the same red granules.

The authors succeeded in cultivating the fungus on Sabouraud's agar; the colonies develop slowly, are small, cerebriform and of red colour. The fungus has a very delicate branching mycelium; sporulation is abundant; some of the mycelial threads are very fragile and appear occasionally as strings of spherical coccus-like bodies, gram positive. They identify the fungus with the germ found by LAVERAN in similar granules derived from a previous case of PELLETIER'S. The germ, owing to the numerous coccus-like bodies present, was at first considered by LAVERAN to be a micrococcus: *M. pelletieri.* It is in reality a hyphomycete, *Oospora pelletieri* Laveran, 1906.

In the discussion which followed PINOY remarked that the fungus cannot be regarded as an Oospora, as the mycelial filaments are not septate and do not contain differentiated nuclei. The hyphomycete should be placed in the genus *Nocardia*—the correct name being *Nocardia pelletieri* Laveran, 1906.

A. C.

AUSTREGESILO (A.). **Un Cas d'Angiokératome semblable au Pied de Madura.**—*Arch. f. Schiffs- u. Trop. Hyg.* 1912. Sept. Vol. 16. No. 18. pp. 622-625. With 2 plates.

The author describes an interesting case of pseudo-madura foot in a negro in Brazil. The left foot was much enlarged and contained several nodules with openings from which a white material exuded. The right foot was also affected but less severely. There was pain and pruritus. Microscopical and bacteriological examinations made by RABELLO revealed the absence of *Nocardia* or other fungus. VIANNA also found no fungi and from the histological examination came to the conclusion that it was a case of angiokeratoma.

[Cases of pseudo-mycetoma of various nature are not rare in the tropics. A fairly common type found in Ceylon is a late manifestation of yaws.]

A. C.

Wolbach (S. B.) & Todd (John L.). A Study of Chronic Ulcers, Ulcus Tropicum, from the Gambia.—*Jl. Med. Research.* 1912. Sept. Vol. 27. No. 1. pp. 27-43. With 3 plates.

A complete account of ulcus tropicum as observed in the Gambia is given. The condition is more frequent in children and women than in men. Some of the adults dated the beginning of the affection to an attack of a disease called "Koulo-Feting," the symptoms of which include fever and rheumatic pains. Koulo-Feting corresponds somewhat to the onset of yaws and the virus of ulcus tropicum may have become engrafted upon the yaws lesions.

All the cases but one were chronic. The ulcer was almost always covered by a thick greenish-grey tenacious exudation, often foul-smelling. When this was removed a granulating surface was generally exposed. The granulations were very abundant, occasionally fungating in children. Advanced ulcers often showed raised edges of brawny consistency, rarely undermined.

Organisms found in the ulcers.—Spirochaetes were present in eight cases out of twenty-two. Several types were met with; one constant in the eight cases is 10-18μ in length, stains rather faintly, taking a bluish-purple colour; extremities taper rather abruptly; it has 4 to 12 spirals, commonly between 5 and 7.

In addition, two other types were observed, staining red instead of bluish: one short, thick, with close spirals; the other long, thick with blunt ends and close spirals.

Besides spirochaetes, in all cases but one, bacilli of various types and cocci were present—fusiform or spindle bacilli of the Plaut-Vincent type were extremely common. The authors are inclined to consider ulcus tropicum a disease of spirochaetal origin, agreeing in this with Prowazek, who some years ago named the spirochaete which he considers the cause of the malady *S. schaudinni.* Prowazek's belief is supported by the researches of Brault, Leboeuf, Lenz, Keysselitz and Mayer, and Bruce.

Histo-pathology.—The fundus and walls of the ulcer consist of granulation tissue in which there is nothing distinctive. The deeper tissues and corium surrounding the ulcer present a very heavy lymphoid and plasma cell infiltration. The surface of the ulcer is covered either by a tenacious membrane composed almost solely of spirochaetes and bacteria or by a layer of coarsely meshed hyaline fibrin in which masses of spirochaetes and bacilli are found. The epithelium surrounding the ulcer shows the usual thickening and down-growths, as in all chronic ulcerative processes. In one early case a great increase in the prickle cell layer (acanthosis) was noted. The epithelium is heavily invaded by polymorphonuclear leucocytes. The corium is edematous. In the deeper layers there is extreme infiltration with lymphoid and plasma cells, the latter being the more numerous. Large numbers of eosinophiles are found in the vicinity of the small vessels.

The authors conclude that ulcus tropicum is probably due to *S. schaudinni,* Prowazek. In their opinion the fact that the ulcer is generally solitary and on regions exposed to trauma, supports the explanation that the process is a reaction to an organism having slight powers of invasion. They also believe that the non-absorbing dressings—pulverized dry leaves covered with large green leaves—generally used by natives, are favourable to the extension of the ulcerative process into the deeper tissues.

A. C.

RODENWALDT (E.). **Salvarsan bei Tropengeschwür.** [Salvarsan in Treatment of Tropical Ulcers.]—*Arch. f. Schiffs- u. Trop. Hyg.* 1912. Aug. Vol. 16. No. 16. p. 562.

KÜLZ (L.). **Salvarsan bei Ulcus tropicum.**—*Ibid.* p. 563.

HALLENBERGER. **Beitrag zur Behandlung des Ulcus tropicum mit Salvarsan.**—*Ibid.* Sept. No. 18. pp. 625-627. With 1 plate.

Rodenwaldt claims extremely good results in the treatment of many cases of tropical ulcers with salvarsan given by intramuscular injection.

According to Külz the local treatment of ulcus tropicum by salvarsan applied as a powder or as an ointment (salvarsan 1, vaseline 10) is not beneficial and often induces a painful inflammation.

Hallenberger has used salvarsan in two cases of ulcus tropicum. Each patient received an intramuscular injection of 0·5 gm. suspended in olive oil. The drug did not give rise to any unpleasant symptom. Complete cure took place rapidly in both cases.

A. C.

CASTELLANI (Aldo). **Note on Copra Itch.** (With a Report on the Mite causing it, by Stanley HIRST.)—*Jl. Trop. Med. & Hyg.* 1912. Dec. 15. Vol. 15. No. 24. pp. 374-375.

Castellani describes an eruption often found in people handling copra. The hands, arms, legs, and sometimes the whole body except the face, present fairly numerous, very pruriginous papules, often covered by small bloody crusts due to scratching; papulo-pustules and pustules are also generally present. The condition closely resembles scabies, but true burrows are never observed. It is probably due to an acarus-like parasite swarming in many samples of copra.

The mite may at times be found on the hands and arms of the affected persons, but remains on the human body only temporarily: it does not bury itself in the skin as does the *Sarcoptes scabiei.* It apparently induces the dermatitis in the same manner as *Pediculoides ventricosus* (Newport), which lives in diseased cereals, and produces an eruption in persons handling them. The eruption has no tendency to spontaneous cure while the patient goes on working in infected copra mills.

Experimental reproduction of the disease.—When copra dust containing the mite is rubbed into the skin, itching frequently begins very shortly after and 24 to 48 hours later an extremely pruriginous urticarial or papuloid eruption often develops. The same result was obtained by picking the mites out of copra dust and placing them (alone, without any dust) on the skin under a covering such as a piece of lint kept in place by a bandage. The pustular stage did not occur, but being due to scratching and secondary pyogenic infections there was no time for it to develop, all the people refusing to go on with the experiment after the second day. Some individuals are unaffected by the presence of the mite or the copra dust containing it.

The best treatment is the daily application of β naphthol ointment. Its action in these cases cannot be compared to what takes place in scabies, because in copra itch the acarus-like parasites remain for only a short time on the body, and in most cases when the ointment is applied at night they are no longer there. It may act as an antipruritic antiseptic and in this way diminish scratching and secondary pyogenic infections. It is probable also that a small amount of the ointment may remain on the skin after the morning bath and be repellant to the mite, in this way preventing the daily reinfection which otherwise takes place.

In his annexed report Mr. Stanley Hirst of the Natural History Museum considers the copra mite to be a new variety of *Tyroglyphus longior*: (*Tyroglyphus longior* Gerv. var. *Castellanii* Hirst). This variety differs from the typical species—which is often found in cheese—by the absence in the male of the two hairs on the ventral surface of the body, some distance behind the anal suckers. Length of male 0·34 mm.; of female 0·4 mm. Figures are given.

A. C.

GABBI (U.) & SABELLA. **Malattie cutanee.**—*Commissione Govern. p. l. Studio d. Malattie Tropicali nella Libia. Malattie Infettive e Malattie cutanee.* 1° *Contributo ad Opera di U. Gabbi, F. Scordo, G. Rizzuti* (Ministero d. Interno e d. Guerra: Direz. Gen. d. Sanità Pubblica). 1912. Messina. Stab. Tipograf. Guerriera. pp. 22-26.

The authors call attention to the great importance of tropical skin diseases in Tripoli. Amongst one hundred cases of skin diseases they found the following tropical ones: pian (yaws), 4 cases; pyosis tropica, 7 cases; ulcus tropicum, 5 cases; lichen tropicum, 3 cases; granuloma pudendum, 2 cases; ulcus infantum, 1; Tinea alba, 1; Tinea nigro-circinata, 1.

Of cosmopolitan dermatoses, scabies, favus, and trichophytic affections were very frequently met with. Lesions of tubercular and syphilitic origin were also common.

A. C.

BOOK REVIEWS

ALLEN (R. W.). **Vaccine Therapy. Its Theory and Practice.** Fourth Edition. x+444 pp. Demy 8vo. 1912. London: H. K. Lewis. [9*s.* net.]

This edition of the above work brings the subject of vaccine therapy up to date. So great have been the developments and extensions of the subject since the appearance of the third edition in 1910 that the author has had to alter the scheme of the work, so as to convert it into a systematic account of the applications of vaccine treatment to the bacterial diseases of the various parts of the body. Tropical readers will be specially interested in the parts dealing with the vaccine treatment of plague, cholera, leprosy, dysentery, undulant fever and oriental sore. The parasite of the latter, *Leishmania tropica,* is not a spirochaete as the author states on p. 166. The vaccine treatment of plague and cholera is at present confined to preventive inoculation and in both cases the method has proved of value. In leprosy, however, it has been a failure and for undulant fever it does not hold out much hope.

The details of vaccine therapy must be mastered by the practitioner abroad as well as at home, however, and the present book can be thoroughly recommended for this purpose.

G. C. L.

LETULLE (M.) & NATTAN-LARRIER (L.). **Précis d'Anatomie Pathologique.** Vol. 1. 940 pp., 248 figures. 8vo. (Collection de Précis Médicaux.) 1912. Paris. Masson & Cie, Editeurs. [16 fr.]

This volume is the first of a work on pathological anatomy. It is divided into two parts, I General pathological histology—inflammation and tumours, II Special pathological anatomy—the circulatory system, the respiratory system and the mediastinum.

There are 248 original figures in the text, many of distinct merit, and a very full index is appended. A second and last volume is in preparation.

There is a distinct opening at the present time for an up to date and well illustrated treatise on pathology such as the above and the volume should have a ready sale.

G. C. L.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. I.] 1912. [No. 5.

PAPPATACI FEVER.

Annual Report of the Sanitary Commissioner with the Government of India for 1910.—1912. Calcutta: Superintendent, Government Printing, India. pp. 5-9 and 25.

Sandfly Fever in India in the Year 1910.—The term "sandfly fever" was introduced into the returns of statistics for the first time in the year 1910. The total number of cases recorded among the European and Native Troops is 1,058; they occurred in Peshawar, Nowshera, Attock, Kila Drosh, Chitral, and Kohat in the Punjab, and on the N.W. Frontier; in Bengal at Dinapore; in Rajputana at Neemuch and Mount Abu; in Bombay at Hyderabad; at the Himalayan Hill stations, Gharial and Dalhousie; and at Lucknow. This by no means represents the extensive prevalence of this disease throughout India. It is stated that it appears doubtful whether its great importance as a cause of sickness among the troops in India has yet been widely realised. Many cases were returned under the heading "pyrexia of uncertain origin" and several good clinical accounts of the malady appeared under that designation in the annual reports. There were, in all, 8,705 cases of "pyrexia of uncertain origin." The seasonal prevalence of 6,475 of these is given, and it is seen that 4,494 occurred during the months April to October, and hence probably were mostly sandfly fever. The *Phlebotomus papatasii* is found at Rawal Pindi; in the garrison of British troops, who numbered 2,861, there was a summer outbreak of 153 cases of fever which were registered "pyrexia of uncertain origin," though for the most part they were instances of sandfly fever. In many other stations similar errors were made. Again 257 of the 416 cases of influenza recorded in the statistics were admitted during the months April to October, and they occurred chiefly in places where the Phlebotomus abounds; they were therefore presumably sandfly fever, which has long been known as "summer influenza." We many conclude that during the hot weather of 1910 there were no less than 4,000-5,000 attacks of sandfly fever among the European and Native Troops of the Indian Army.

There is an excellent account of the symptoms of the fever and of the life history of the Phlebotomus. **ANNANDALE** has described

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six species found in India in addition to *P. papatasii*, but the habitat of the larvae has not been discovered. In 1908 PATEL obtained two larvae from drains, but there is no record of any finds in India since that date.

C. Birt.

Report on the Health of the Army for the Year 1911.—1912. Vol. 53.

The Incidence of Sandfly Fever among British Troops.—This report, which was published in December 1912, enables us to follow the incidence of sandfly fever in the European army of India during the year 1911. There were 1,393 admissions for this disease, which occurred at Peshawar, Nowshera, Attock, Rawal Pindi, Multan, Hyderabad, Kamptee, Quetta, Mhow, Lucknow, Meerut, and Lahore. Hence the true nature of these short febrile cases is becoming recognised more and more. "Pyrexia of uncertain origin" still accounts for 1,014 admissions, and "influenza" for 279, so that it is probable that many cases have been overlooked. The minute size of the Phlebotomus, its nocturnal habits, and its success in concealing itself during the day-time often cause one who is not an expert hunter to pronounce that it is not to be found, when it exists at a station. Since the bite of one sandfly may convey the infection, statements to the effect that short febriculas can not be sandfly fever, because no Phlebotomus has been discovered, must be received with caution.

At Malta there were 125 cases during the year 1911. At Cyprus one is recorded. In Egypt there were 96. At Tientsin and Peking 45 attacks were observed, which bore a general resemblance to the malady as seen in Malta, and occurred at the period when sandflies are most numerous. 54 of such cases are noted in the Hongkong returns.

C. B.

ROBINSON (S. C. B.) & BLACKHAM (R. J.). **Sand-Flies and Sand-Fly Fever on the North-West Frontier of India.**—*Jl. R. Army Med. Corps.* 1912. Oct. Vol. 19. No. 4. pp. 447-452.

The annual Reports of The Sanitary Commissioner with The Government of India from their commencement contain records of extensive yearly outbreaks of summer fever, now known to be sandfly fever, in Peshawar and other stations on the North-West Frontier of India. In the year 1911 this infection caused 848 admissions to hospital among the British troops of the Peshawar Division. The varieties of Phlebotomus that are found in the Peshawar Valley are *P. papatasii*, *P. minutus*, *P. molestus*, and *P. babu*. Sandflies are most numerous during the end of April and in May. Their numbers lessen in June and July; increase in August; diminish again in September and October. The flies disappear at the close of the latter month. The incidence of the fever fluctuates in like manner. Twelve officers made unsuccessful experiments to breed the insect from many varieties of material. They were seldom able to keep the sandfly alive in captivity longer than three or four days. Moisture favours their survival. As preventive measures, the use of fine meshed nets, punkahs, and electric fans is recommended. It is stated that a brightly burning kerosene lamp appears to attract the flies more than the human being. Evacuation of barracks may be necessary. This was required at Kila Drosh. In 1910, 75 per cent. of the troops were attacked. The fort was evacuated on the first of June 1911, with the result that the incidence was reduced to 27 per cent.

C. B.

MANTEUFEL. **Notiz über ein bisher an der deutsch-ostafrikanischen Küste nicht bekanntes "Sommerfieber."** [Summer Fever in German East Africa.]—*Arch. f. Schiffs- u. Trop. Hyg.* 1912. Sept. Vol. 16. No. 18. pp. 619-622

During the hottest and driest months of the year in Daressalam a fever prevails which resembles pappataci fever in its duration and clinical features. Examinations of the blood and dejecta for malarial and enteric infections were negative. The epidemic subsides with the advent of the rains and cold weather. A Phlebotomus, the species of which was not determined, was found in the room occupied by one of the sufferers.

C. B.

MÜHLENS. **Malariaforschung in Jerusalem.** [Malaria Investigation in Jerusalem.]—*Deut. Med. Wochenschr.* 1912. Oct. 24. Vol. 38. No. 43. pp. 2036-2037.

During investigations concerning the prevalence of malaria in Jerusalem, the author learnt that an epidemic of fever had broken out at Jaffa. On proceeding there at the end of September 1912, he recognised the malady as pappataci fever. Phlebotomi are numerous both at Jaffa and Jerusalem every summer and cause much annoyance. He ascertained from the local practitioners that similar outbreaks occur annually in both cities.

C. B.

ERCOLANI (Aurelio). **Appunti Clinici sopra le Epidemie de Febbre dei Tre Giorni verificatesi a Forli nel Triennio 1909-1911.** [Three Day Fever at Forli, 1909-1911.] *Malaria e Malat. d. Paesi Caldi.* 1912. May-June. Vol. 3. No. 5-6. pp. 153-158.

Outbreaks of sandfly fever occurred among the troops at Forli (near Ravenna) in July and August of each year. The cases were much more numerous in some barracks than in others. The fever was not contagious. Its incubation period was under 8 days. The onset was sudden. The temperature rose rapidly to 40° or 40·5° C. There was severe frontal headache; pains in the back and lower limbs, especially in the knees; the conjunctivae were congested, and photophobia was often present. The tongue was furred, and sometimes vomiting and diarrhoea occurred. Mental depression was frequent and occasionally the patient became delirious. The pyrexia declined gradually. In 80 per cent. of the attacks the pulse-rate was slow, often only 90 at the height of the fever, but might fall as low as 40. The leucocytes numbered 4,500-5,000 on the second day, falling to 3,000-3,500 on the third day. The mononuclears were relatively increased. The leucopenia continued till the eighth or tenth day. Bacteriological examination of the blood was negative. The duration of the pyrexia was usually 60 hours, but varied from 36 to 72 hours. Convalescence was slow, weakness continuing for ten or fifteen days. Acute nephritis was a complication in two instances.

C. B.

GABBI (U.). **Su di una Nuova Epidemia di Febbre dei Tre Giorni nella Sicilia Orientale. (Secondo ed ultimo contributo.)** [A Fresh Epidemic of Three Day Fever in Eastern Sicily.] *Studi Intorno alle Malattie Tropicali d. Italia Meridionale, d. Isole e d. Colonie.* Archivio trimestrale. 1912. No. 4.

An epidemic of pappataci fever broke out in Catania, Palermo and Partinico in the summer of 1911. The symptoms were milder than those which were observed in the outbreak of the summer of 1910; there were no deaths, nor severe complications; debility was less marked during convalescence than in the previous year.

C. B.

LEGER (M.) & SÉGUINAUD (J.). **Fièvre de Pappataci en Corse.**—*Bull. Soc. Path. Exot.* 1912. Nov. Vol. 5. No. 9. pp. 710-713.

There are annual summer outbreaks of a fever which resembles pappataci fever at Bastia and in its neighbourhood, in the northern part of the island of Corsica. It is very prevalent at Toga, a sea-side resort much frequented by the inhabitants of Bastia. The cases were less numerous in the summer of 1912 than in previous years, which was attributed to the greater frequency of the boisterous south-west winds. The *Phlebotomus papatasii* was captured at Toga. Seven temperature charts are given; in two cases the pyrexia lasted four days; in two, five days; and in the remaining three, seven, eight, and nine days respectively. The maximum temperature recorded in these is 105° F. Hence it is evident that the infection is of a more severe type than is usual, though it is a mistake to suppose that sandfly fever never extends beyond a period of three days.

C. B.

SEIDELIN (Harald). **Pappataci Fever.**—*Yellow Fever Bur. Bull.* 1912. July. Vol. 2. No. 1. pp. 74-84.

The bibliography of pappataci fever is given on pp. 116-120 of this number. More than one hundred references are quoted. Siedelin gives a concise summary of our knowledge on this subject.

C. B.

PHLEBOTOMUS AND ITS BIONOMICS.

LANGERON (Maurice). **Localités Nouvelles de Phlébotomes.**—*Compt. Rend. Soc. Biol.* 1912. June 21. Vol. 72. No. 22. pp. 973-974.

A. WEISS* reported the discovery of *Phlebotomus perniciosus* and *P. nigerrimus* on the island of Djerba off the Tunisian coast. Langeron agrees with the identification of the specimens. In Tunis he has met with *P. papatasii* only. The same species exists at Saint-Cyr au Mont-d'Or near Lyons. This locality is a connecting link between those in Bourgogne and in Valteline where its capture has been recorded. Saint-Vallier de Thiey (Alpes-Maritimes) and Montpellier (Hérault) are the only other places in France where it is known.

C. B.

FOLEY (H.) & LEDUC (H.). **Phlébotomes dans le Sud-Oranais. Accidents Simplement Locaux dûs à leurs Piqûres.**—*Bull. Soc. Path. Exot.* 1912. July. Vol. 5. No. 7. pp. 511-513.

Phlebotomi are common in the oases of southern Algeria, particularly in the neighbourhood of Figuig. The species in that oasis, and probably also in the whole of the Sud-Oranais, is *P. papatasii.* The flies appear early in the hot weather, about the second fortnight in April, and disappear entirely at the end of the autumn in October or November. They become much reduced in numbers under the influence of cold and high winds, frequent inhabited houses only, where they hide in dark corners or behind curtains, etc., and avoid white-washed walls. The females bite during the day and night; newcomers often suffer severely. The irritation can be relieved often only by continual scratching; hence a pustular dermatitis frequently follows, which may be mistaken for scabies. Immunity against the bite is soon acquired by most people. The local inhabitants hardly perceive their attacks. No short fever is endemic in Sud-Oranais which might be attributed to these flies.

C. B.

SUMMERS (Sophia L. M.). **A New Species of Phlebotomus from South America.**—*Bull. Entom. Research.* 1912. Aug. Vol. 3. No. 2. pp. 209-210.

Four specimens of a Phlebotomus were received from Rio Javary on the frontier between Brazil and Peru which were peculiar in the length of the head. This with the proboscis is, in the female, half that of the rest of the body. The wing venation resembles that of *P. malabaricus* (Annandale). In the male the greatest length of the wings is three and a half times the greatest breadth. They are bluntly pointed, and the hind border is not very much more strongly arched than the front. The length of the 2nd marginal cell is contained $2\frac{2}{3}$ times in the length of the wing, and that of the third $1\frac{5}{6}$ times. The halteres are long and large. The name *P. rostrans* has been given to this new species.

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* See *Arch. Inst. Pasteur Tunis.* 1911. No. 4. p. 269, and 1912. No. 3. p. 199.

C. B.

UNCLASSED FEVERS OF TROPICS, AND DENGUE.

HUSBAND (James) & HODGE (H. V.). **A Peculiar Fever met with on the North-West Frontier.** [Mirror.]—*Indian Med. Gaz.* 1912. Aug. Vol. 47. No. 8. pp. 317-318.

The authors state that during the last two years they have noticed independently several cases of an obscure continued fever among the Sepoys on the North-West Frontier, in which they have failed to make a diagnosis. Eleven cases were observed having practically the same clinical picture; one of the noticeable characters was that according to the temperature chart the patient was suffering from a long and severe fever, though according to himself he was comparatively well. [This is a common characteristic of undulant fever cases.] All the cases were tested for typhoid and paratyphoid; one only gave a positive result at a 1/50 dilution for typhoid. Several were tested with the *M. melitensis*, but the results were negative, while no signs of tubercle or hepatitis which might have accounted for the fever were present. The authors consider that the cases were suggestive of short and mild infections of undulant fever, which is possible, as that disease undoubtedly occurs in the district; but in this fever there were no joint pains nor subsequent neuritis, and the fever did not last more than thirty days.

P. W. Bassett-Smith.

TAYLOR (D. M.). **The Relationship between "Pyrexia of Uncertain Origin" and Enteric Fever.**—*Indian Med. Gaz.* 1912. Oct. Vol. 47. No. 10. pp. 397-398. With 6 charts.

The author describes six cases of an infective disease which he had under treatment [place not stated]. The serum reactions were negative in all for typhoid, paratyphoid A. and B., and undulant fever; malarial parasites were not present. Three of the cases resembled typhoid clinically so closely that no other diagnosis was possible, two suggested paratyphoid, the sixth showed no definite character. An undoubted case of typhoid with a marked positive reaction died in the hospital at the commencement of the series. The author suggests not only that typhoid may occur in mild atypical forms, but that in these the reaction may be negative. This would account for many obscure fevers which are returned in India as pyrexia of uncertain origin.

[It would rather seem that we have to deal with an infective disease, not typhoid, but closely allied to it, of which the specific cause has not yet been determined.] The charts of the six cases are given.

P. W. B.-S.

Bradley (F. H.) & Smith (F.). A Curious Case of Fever in Calcutta.—*Jl. R. Army Med. Corps.* 1912. Aug. Vol. 19. No. 2. pp. 219-221.

This case occurred in a European soldier at the Jaffarpur camp, a few miles from Calcutta. When admitted to the hospital the patient was very ill, his conjunctivae were injected, and the face was dusky. A few days later a rash appeared which covered the face, extremities and body; this resembled the subcuticular mottling of measles, with small pink spots. The bowels were constipated. The patient's appearance became dull, the face more congested; urine was passed in the bed. There was then a sudden crisis followed by collapse, necessitating intravenous injections. After this he rallied and the fever did not return, but bed sores formed, and there was muttering delirium. He gradually improved, and six days after the crisis was out of danger. A diagnosis of typhus was made, but as there was considerable doubt, the case was returned as "Pyrexia of uncertain origin." Typhus occurs in the Punjab; it is possible that in some obscure way infection may have reached this man from the Pathans who come to Calcutta in the autumn. [The congested face, the character of the eruption, and the marked nervous symptoms are suggestive of a sporadic case of typhus, such as is occasionally seen at Shanghai. It is not stated whether there was a polymorphonuclear leucocytosis, which is generally a marked feature in the blood of typhus.]

P. W. B.-S.

Kennedy (R. S.). Some Notes on an Epidemic of Dengue-Form Fever amongst Indian Troops, Calcutta. [Mirror.]—*Indian Med. Gaz.* 1912. Nov. Vol. 47. No. 11. pp. 436-440. With 5 charts.

The author describes an epidemic of a fever of short duration which occurred during June, July, and August among the troops at Calcutta, and was at the time very common particularly in the northern part of the town. It chiefly affected the 40th Pathans at Alipore, and is stated to have spread with wonderful rapidity. Charts are given showing the curves of incidence of the disease, and the distribution of the cases throughout the lines. In July 319 cases were admitted to hospital, 194 of which came from the 40th Pathans, but all classes were affected, the disease passing from the sweepers' lines to the officers' quarters. No causative organism was found, but it was noticed that men admitted to the hospital for other diseases did not contract the fever, though they were sleeping in beds close to one another; this points to conveyance of infection from the sick to the healthy by some means which was not present in the hospital. After a review of the possible blood-sucking intermediaries, *Culex fatigans* was considered to be the most probable, as it was abundant both in the native lines and in the officers' quarters. An attempt to transmit the disease by means of mosquitoes failed owing to the death of the insects. A description of the clinical symptoms and many temperature charts are given. The former suggest dengue; the latter show anything from a three day fever type to the typical double pyrexial attack common in dengue and seven day fever. The author believes that the epidemic was a form of dengue, but he forms no conclusion as to whether it was the same disease described by **Rogers** as seven day fever.

[The description given by the author is exactly similar to epidemics of fever noted by the reviewer in the Defence flotilla force in Bombay, and then classed as dengue.]

P. W. B.-S.

Castellani (Aldo.). i. **Cases of Fever probably due to *Bacillus asiaticus*.**—*Jl. Trop. Med. & Hyg.* 1912. June 1. Vol. 15. No. 11. pp. 162-166. With 2 charts.

ii. **Observations on some Intestinal Bacteria found in Man.**—*Centralbl. f. Bakt.* 1. Abt., Orig. 1912. July 17. Vol. 65. No. 4-5. pp. 262-269.

From two cases of obscure fever occurring in Ceylon the author isolated a peculiar bacillus which he calls *B. asiaticus* (1) and from two further cases a very similar organism termed *B. asiaticus* (2). Clinically the patients suffered from a low type of fever, two were infected with intestinal worms, and all had abdominal discomfort. In case 1. the organism was isolated from the faeces and the blood. A vaccine was prepared from it and, given therapeutically, appeared to cut short the fever. Specific agglutinins acting in dilutions up to 1 in 300 were present for six months in the patient's blood, but none were present for other common intestinal infective micro-organisms. In case 2. the organism was only isolated from the faeces, but agglutination reactions were present. Case 3. suffered from a low fever lasting four months, associated with abdominal pains. *B. asiaticus* (2) was isolated twice from the faeces. His serum gave negative reactions to all organisms except *B. asiaticus* (2) 1/80. *B. asiaticus* is described as a short, non-motile, gram negative, dysentery-like bacillus, which gives acidity with gas, in glucose, sorbite, saccharose media, etc., but gives no acidity or gas with adonite, lactose, or milk; the latter is often decolourised but there is no clotting. When freshly isolated it is pathogenic if given intra-peritoneally to guinea pigs. *B. asiaticus* (2) differs only in biological reactions.

The following is a summary of the author's conclusions.—In four obscure fever cases in Ceylon a new bacterium was found differing from any other intestinal bacterium. It occurs in two varieties *B. asiaticus* (1) & (2). The proofs of its being the causative agent are: specific agglutinins are produced, decreasing slowly in amount after the fever is over. The blood of the cases did not agglutinate other organisms, nor were other organisms isolated from it. The organism was only found in these cases.

A table is given of the cultural reactions of *B. asiaticus* and 76 other intestinal aerobic bacteria, which should be of considerable use for reference.

P. W. B.-S.

ii. In the course of the last eight years the author has examined the stools of a large number of persons in Ceylon, some healthy and others suffering from various diseases, and has found in the course of these examinations a number of bacteria not previously identified. He gives the names of thirteen species of these, of which two, *Bacillus asiaticus* (1), and *Bacillus asiaticus* (2), seem to be pathogenic, having been isolated from cases of fever and giving specific agglutinating reactions with the serum of the patients afterwards. Both these bacilli are gram negative, non-motile and typhoid-like in growth. The eleven other species were obtained from healthy individuals. The author gives an elaborate table of their sugar reactions, etc., in comparison with those of other intestinal bacilli.

S. R. Douglas.

Fox (A. C.). **Some Obscure Forms of Fever in North China.**—*Jl. R. Army Med. Corps.* 1912. Aug. Vol. 19. No. 2. pp. 209-211.

During the past three years, the author and other officers in the Tientsin district have noticed a peculiar fever among the European troops. Met with at all seasons of the year, it was most frequent during August, September, October, and November, that is, during and after the rainy season when flies were most troublesome. No malarial parasites were present in the blood and the fever was uninfluenced by quinine. The disease is locally known as "ten day fever," and has the following chief symptoms: Fever of a remittent type lasting ten to fourteen days, with frontal headache lasting two or three days; constipation, furred tongue, and slowish pulse. Some patients have abdominal discomfort and pains in the back. Constitutional symptoms were slight, relapses were rare, there was no mortality, and convalescence was rapid. Many of the soldiers who contracted the fever had quite recently been inoculated against typhoid. Major Fox thinks that this may be a paratyphoid infection, but he has not yet been able to have the serum tested.

[The sudden onset, regular course, and apparent protection produced by one attack certainly point to the disease being of a specific nature; the exact character will probably be worked out at Shanghai, where there is a good laboratory.]

P. W. B.-S.

Legendre. **Le Dengue, ses Variétés et la Conservation de son Virus en Indochine.**—*Bull. Soc. Méd. Chirurg. de l'Indochine.* 1912. Vol. 3. No. 7. pp. 456-462.

The author gives a list of cases of various degrees of severity, which he has observed. He comes to the conclusion that dengue has existed endemically at Hanoi since the epidemic of 1910, but in spite of the presence of so many non-immune persons it has not caused a severe epidemic. Most of the cases seen were ambulant or very mild ones, lasting from one to three days. These were not malaria, this disease being excluded by careful blood examinations. The author shows that one attack of dengue is not always protective, and quotes the case of a child which had two attacks at an interval of 16 months.

His observations show, contrary to what has been noted by VASSAL, that the adult Annamites are susceptible to the virus of dengue.

P. W. B.-S.

POLECK. **Uber das Sechstagefieber in Apia.** [Six Day Fever in Apia.]—*Arch. f. Schiffs- u. Trop. Hyg.* 1912. Oct. Vol. 16. No. 20. p. 708.

The author, in continuation of previous work, makes observations on 12 fresh cases of this fever in the Somoan Islands. He notes that one attack does not give immunity and that leucopenia is well marked. He believes that the infection is conveyed by means of *Culex fatigans*, and that the causative organism is a long gram-negative streptococcus growing anaerobically.

[The details are few and no experimental proof is given.]

P. W. B.-S.

NÄGELE. **Über eine merkwürdige fieberhafte Erkrankung.** [On a Remarkable Febrile Disease.]—*Arch. f. Schiffs- u. Trop. Hyg.* 1912. Oct. Vol. 16. No. 20. pp. 705-707.

The author describes a peculiar febrile disease in German South West Africa. The symptoms are an urticarial eruption affecting both skin and mucous membranes, marked nervous disturbances, vertigo, loss of muscular power, neuritis, pain in the joints, and affection of the glands. The disappearance of the wheals is followed by exfoliation of the skin.

Relapses are frequent; the blood shows nothing distinctive. It is stated that the disease bears a resemblance to dengue fever during the first day, but differs in not being epidemic, in the frequent recurrence of the eruption, and in the comparative lowness of the temperature.

[The symptoms appear to point to some food toxin.]

P. W. B.-S.

DEEKS (W. E.). **A Preliminary Report on a Hitherto Unrecognized Six-Day Fever in Ancon, Canal Zone.**—*Jl. Amer. Med. Assoc.* 1912. Oct. 26. Vol. 59. No. 17. pp. 1511-1513.

PERRY (J. C.). **Outbreak of Seven-Day Fever in the Canal Zone.**—*U.S. Public Health Rep.* 1912. Nov. 1. Vol. 27. No. 44. pp. 1774-1775.

Deeks describes the occurrence of an infective fever of short duration affecting twenty persons all living in close proximity. Those admitted to the hospital were carefully studied. The disease appeared to be infectious in the early stage only, as it did not spread in the hospital though no special precautions were taken. The onset was abrupt and the temperature always fell to normal on the sixth day, often after a precritical rise. The spleen was large; the kidneys showed signs of irritation; there was slight gastric discomfort. No marked change of pulse, respiration, or blood content was noticed, but general fever pains were present with an early erythematous rash, and in three cases a late scarlatiniform eruption.

The disease was at first thought to be malaria, but no parasites were ever found. From dengue it is distinguished according to the author by the large spleen, the single phase fever, and the absence of severe pains. He thinks the disease is identical with the seven day fever of India described by ROGERS, and that it was probably introduced with the mails from some infected port, as the first cases were Post Office workers.

Perry gives a description of the cases which occurred at Ancon with four additional ones admitted from a neighbouring village; he believes that the fever is identical with seven day fever as described by CASTELLANI from India and Ceylon, and states that it was neither dengue nor yellow fever.

[The fever resembles very closely the form of dengue described by ASHBURN and CRAIG in the Philippines.]

P. W. B.-S.

YELLOW FEVER.

SEIDELIN (Harald). i. **Report of Yellow Fever Expedition to Yucatan, 1911-1912.**—*Yellow Fever Bureau Bull.* 1912. Oct. Vol. 2. No. 2. pp. 123-242. With 3 plates and 2 maps.

ii. **Sull' Etiologia della Febbre Gialla.**—*Malaria e Malat. d. Paesi Caldi.* 1912. Sept.-Oct. Vol. 3. No. 9-10. pp. 245-246.

The outbreak of yellow fever investigated by the expedition lasted from August 3rd, 1911 to April 30th, 1912. The total number of cases officially diagnosed was 73, with 38 deaths. The disease was officially reported from Kambul, Maxcanú, Temax, and S. Felipe, and the author saw a case in Izamal. The experience of the last epidemic leads him to regard not only Mérida but the whole state of Yucatán as endemically infected. No importation of virus has been necessary to keep up the infection, but the arrival of a considerable number of non-immune foreigners has as a rule been sufficient to give rise to a severe outbreak with typical cases, whilst in the meantime cases with less typical and less severe symptoms have occurred in natives. The last outbreak was caused by the arrival of two battalions of soldiers from non-infected parts of the Mexican Republic. It is argued that yellow fever may occur with the severest manifestations of the disease in some cases while in others there is every transition to a milder type in which diagnosis may be very difficult or impossible. It is a recognised fact that in epidemics of yellow fever the new arrival is more liable to infection than the old resident and natives who have an acquired immunity. The author believes in the existence of a "*microbe carrier*" which is responsible for the maintenance of the virus during periods when the disease is latent and does not think that the fragile infected Stegomyia itself can be the lasting reservoir. Another point raised is the possibility of a second infection. The author considers that one attack does not necessarily confer an absolute immunity. He explains the usually mild form of the disease in natives as due either to an unrecognised infection in childhood or the heriditary transmission of antibodies from immune parents.

Thirty-five pages of the Report are devoted to a consideration of the cases observed and to the occurrence of yellow fever in natives. It is unnecessary to enter into a discussion of the clinical features of the cases. The author himself suffered from mild fever (maximum 100·4°) lasting two or three days and accompanied by slight jaundice, traces of albumin in the urine, and low pulse rate. Though five years before he suffered from what was considered to be yellow fever he again diagnoses his own case as one of this disease, in spite of the very mild nature of the attack. An examination of his blood failed to reveal any malarial parasites but on five occasions during ten days there was found the *Paraplasma flavigenum*, the bodies which the author considers to be the parasite of yellow fever and a further study of which was the main object of the Expedition. As regards the disease in the native the author has collected information from the local medical men, many of whom are convinced that it occurs in them in a mild form. An account is given of some typical and severe cases occurring in natives who had been continuous inhabitants of the endemic areas.

Nineteen pages are devoted to the *Paraplasma flavigenum.* The author has seen his parasite in fifteen confirmed cases of yellow fever out of sixteen examined. The one negative result was due to the blood examination having been made too late in the disease. In one other case he found his organism in a blood film made at the commencement of a disease which was diagnosed as yellow fever post mortem. A table of the seventeen cases is appended showing the days on which the organisms were present in the peripheral blood. In two cases they were present on the first day of illness, in one case on the second day, in four cases on the fourth day, in five cases on the fifth day and sixth day. In one case they were found on the sixth, seventh, and eleventh to fourteenth days, while they were absent on the eighth and ninth and fifteenth days. The author sums up the results of his blood examinations for *Paraplasma flavigenum* in undoubted cases of yellow fever carried out on this and former occasions and finds that he has had approximately 106 positive cases out of a total of 120.

The author examined the blood of a large number of patients who were admitted to the lazaret on suspicion of yellow fever. They were non-immune foreigners with febrile disease. In thirty cases *Paraplasma* was found and of these thirteen were later diagnosed as yellow fever, while *Paraplasma* was found in seven cases seen in the city or country and of these three were officially diagnosed as yellow fever. Thus the parasite was found in 21 cases in which yellow fever was not diagnosed but which were all febrile cases of short duration with no definite local symptoms. Amongst the suspicious cases the author includes his own which was exceptional for a mild case in that the *Paraplasma* persisted in the blood even into the convalescent stage. In the mild cases the *Paraplasma* usually disappear quickly from the blood, so that they may have been overlooked in those admitted to the lazaret at a later stage of their illness.

In the section devoted to a consideration of the rôle and nature of *P. flavigenum* the author records the examination of 421 blood specimens as controls. In 136 cases malarial parasites were found and in 283 no parasites at all, while in two young children under no suspicion of yellow fever *P. flavigenum* occurred. The author recalls the fact that he recorded (1911) two similar cases which harboured *Paraplasma* and did not suffer from yellow fever. He suggests that these four cases may be "*microbe carriers.*"

As regards the morphology of the parasites themselves the author has nothing of essential importance to add to the descriptions which he has given in his earlier papers. No definite life cycle has been determined, but elements have been observed which "it can hardly be a mistake to consider" as division forms. The author adheres to his original view that the *Paraplasma* represents a new genus in the family *Babesiidae.* In answer to criticisms by Agramonte he tells us something of the number of *Paraplasma* encountered in his cases. He says that in his earlier series considerably more than three or four parasites had been observed in one smear though this was not the rule. It has not been the rule either in the last series but, exceptionally, larger numbers have been found. For instance in smears made from his own blood during his illness and in three from another case the author has "*repeatedly counted over forty parasites in a very thin film.*" [It perhaps ought to be remarked here that it is rather anomalous that the greatest number of parasites should have been found in the author's own case which he admits was of the mildest nature and which he includes only with the suspicious cases. The other case with large numbers of parasites was only seen late in the disease and the author had to rely on the patient's own account of the beginning of his illness which however conformed to the yellow fever view, since there was fever, haemorrhagic black vomit, melaena, jaundice and suppression of urine. When apparently recovering he suffered a recrudescence and it was then that he came under the author's notice in the lazaret. It would appear then that the number of parasites present in the peripheral blood bears no relation to the severity of the disease.]

Dark ground illumination was used but without very definite results. In one case, during the time that *Paraplasma flavigenum* was present in stained films, motile intracorpuscular bodies were seen which the author has no hesitation in identifying as his parasite.

Experimental work was conducted with guinea pigs. Blood from yellow fever cases was inoculated into four animals. None of them showed any symptoms resembling the disease. In two however structures, absent before, appeared in the red cells on the fourth and following days. These bore a striking resemblance to *P. flavigenum*, so much so that the author thinks that the organisms injected had multiplied to a certain extent in the animals and had invaded the erythrocytes but were unable to establish themselves to the extent necessary to produce any clinical symptoms. Experiments conducted with Stegomyia fed upon the cases gave unsatisfactory results.

In treatment salvarsan was given intravenously in one case in a dose of 0·1 gm. at noon and 0·2 gm. at 9 p.m. of the same day. No untoward symptoms followed the injections and the patient recovered.

The yellow fever section of the report closes with an account of a mosquito survey of Mérida followed by notes on the methods to be adopted for mosquito extermination, such as filling in and draining, petrolization and screening, fumigation with sulphur, etc.

In the final summary of his results the author writes:—

> "*P. flavigenum* was found in practically all cases of yellow fever, in a number of suspicious cases, and in two apparently healthy native children; it was not found in other febrile diseases. I, therefore, consider it the pathogenic parasite of yellow fever."

Several pages of the Report are devoted to a reply to those who have criticised the author's work. SCHILLING-TORGAU[*] does not think the author's bodies are parasites but that they represent structures occasionally present within the erythrocytes of man and animals. AGRAMONTE[†] also objects to the view of the parasitic nature of the bodies, which he claims to have found in various conditions such as goitre, measles, mild biliary obstruction, severe icterus, uncinariasis, typhoid fever, and urticaria. He considers them to be "nuclear and protoplasmic fragments." CARTAYA and GUITERAS have also described intracorpuscular bodies from cases of glanders and icterus and they suppose them to be identical with the author's parasite. The author has examined specimens of the structures found by the last named workers and has no doubt that they are different from those in yellow fever. To the other critics he replies that the number of controls examined during the yellow fever epidemic in Yucatan is sufficient in itself to show that the structures which he describes as parasites are associated with yellow fever and absent in other conditions. He admits that "no observations have been published on the subject of this parasite" except his own.

Two coloured plates accompany the Report. Parasites are shown within red blood corpuscles and also in mono- and polymorphonuclear leucocytes. As seen in the coloured plates of this and previous publications the structures resemble some of the small piroplasmata such as *Theileria parva*. The author states (p. 178) that the forms usually observed were the small intracorpuscular bodies as formerly described. Free bodies were also found both in the peripheral blood and in smears and sections of the organs. [It must be an exceedingly difficult matter to recognise such minute structures in sections of organs and even when seen to be able to make up one's mind that they are identical with those seen in blood films. It must be evident to everyone reading this report that even if one accepts the statements that the bodies are present in cases of yellow fever and absent in other conditions the author has yet to prove that they are parasitic and if so are the etiological factor in the production of yellow fever].

C. M. Wenyon.

LE FANU (G. E. H.). **Medical and Sanitary Administration in the Protectorate of Togo.** Report to the Secretary of State for the Colonies. Received in Colonial Office, April 22, 1912.

The author gives a history of yellow fever in Togoland from the date of the first recorded case in Anecho in 1905. The disease almost certainly existed here before and was probably the cause of the transfer of the Government to Lome in 1895. From 1905 to the middle of 1911 there have been 27 recorded cases, of which 18 ended fatally. It is seen from the table of cases that in the years 1905 and 1906 there were 17 cases, only 4 of which were in natives. In the years 1907, 1910, and 1911 there were 10 cases, all in natives except one. No connection between the various outbreaks could be traced and the only conclusion possible is that the disease is endemic in the native population. It is generally held by the medical authorities in Togo that yellow fever, often in a slight and almost unrecognisable form, occurs among the natives, who are no more immune to yellow fever than they are to malaria. The places mentioned where infection occurred are Anecho, Grandpopo, Agoué, Lome, Badja, Tovega, Sebe, Anima, Misahöhe.

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[*] SCHILLING-TORGAU (V.). Über die Bedeutung neuerer hämatologischer Befunde und Methoden für die Tropenkrankheiten. *Arch. f. Schiffs- u. Trop. Hyg.* 1912. Vol. 16 Beiheft 1. pp. 87–100 : Zur Frage des Gelbfiebererregers. Antwort auf vorstehende Erwiderung des Herrn Prof. Dr. Seidelin. *Arch. f. Schiffs- u. Trop. Hyg.* 1912. June. Vol. 16. No. 11. pp. 373–376.

[†] AGRAMONTE (A.). Yellow Fever a Strictly Human Disease. *New York Med. Jl.* 1912. Sept. 7. pp. 465–468 : Additional Note upon a so-called Parasite of Yellow Fever (Seidelin). *Med. Record.* 1912. Aug. 17. pp. 288–290.

Clinical details and post-mortem findings of some of the cases are given and these present the typical picture of yellow fever infection.

C. M. W.

COLONY OF THE GAMBIA. **Annual Report of the Medical Department for the Year 1911.** [Yellow Fever, pp. 33-38.]

Three outbreaks of yellow fever are reported by Drs. T. HOOD and E. H. READ to have occurred in Bathurst during the year 1911. The first was in May with four cases and three deaths, the second in July with six cases and five deaths, and the third in November with a single fatal case. The characteristic symptoms, high death rate, and post-mortem findings leave no room for doubt as to the nature of the disease. The outbreak reported for 1911 bears a close similarity to the previous epidemic in 1900 in which there were eleven cases amongst Europeans and Syrians between May 23rd and October 30th. The death rate was about the same.

The five cases occurring in May 1911 were in Europeans, two of whom lived in a certain building over a soda-water factory, the other three being friends of theirs who were frequently in the same building. There is some evidence that a native Frontier soldier who was in charge of the soda-water machine was suffering from a mild form of yellow fever on May 8th. It is suggested that this man infected the Stegomyia which are always to be found in the dark ground-floor rooms. These mosquitoes probably found their way to the upper rooms where they infected the five Europeans, the first cases occurring on May 18th. Four other Europeans living in the same building did not contract the disease but this is accountable from the fact that they had not associated with the two inmates who fell sick. It is pointed out however that another explanation of the outbreak is possible. The S.S. Akassa from the coast was lying off the town on May 13th and 14th and at least four of those that had yellow fever went on board and remained there some hours. They may have been bitten by infected Stegomyia brought from some other port.

The second outbreak of the disease commenced on July 6th in a European who was living in a house next to others occupied by Syrians and natives.

The third outbreak consisted of a single fatal case in a European who was taken ill on November 10th. A definite diagnosis of yellow fever was only arrived at after the post mortem.

The active steps taken to check the spread of the disease consisted in the isolation of the cases in mosquito proof wards, the sealing up and fumigation by sulphur of the infected quarters and the establishment of four mosquito brigades to catch and kill mosquitoes in and about the European quarters. It is pointed out that so long as Europeans live in quarters close to natives outbreaks of yellow fever are liable to recur. To deal with Syrians and other non-immunes is more difficult, for they thrive in contact with the natives and short of prohibiting their presence in the town Dr. Hood is convinced that nothing much can be done to prevent their contracting insect-borne diseases.

C. M. W.

AUGÉ (J.) & PEZET (O.). **Epidémie de Fièvre Jaune survenue au Dahomey pendant les Mois de Mai et Juin 1912.**—*Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 648-656.

An account is given of an epidemic of yellow fever and the measures adopted to combat it in Dahomey during May and June 1912. The first case occurred in a young German 24 years of age. This proved fatal and was followed by a second fatal case which was probably infected from the first. On the occurrence of a third case enquiries were instituted in Bohicon, which was the infected centre, and it was found that previous to the first fatal case four Europeans had suffered from a form of fever which the authors consider to be the benign form of yellow fever that usually precedes the more serious cases. It was further elicited that the death rate amongst the natives had been unusually high, especially amongst the children and adolescents. Two travellers who had stayed in Bohicon were seriously ill on arriving at Cotonou. It was clearly shown that Bohicon was an infected centre and steps were taken to cut short the epidemic.—

1. Bohicon was isolated by forbidding departure by train except in the case of special officials and by the formation of a sanitary cordon to prevent movement of the native population.

2. The Europeans were persuaded to leave their residences and to live for a time in groups of not more than four in the neighbouring bush and not to communicate with one another or with any part of the town. Here they were watched for the development of any suspicious symptoms, in which case they were to be isolated in two rooms prepared for the purpose.

3. **Steps were taken to destroy the mosquitoes already existing and to prevent the reproduction of any that should escape destruction. For mosquito destruction sulphur, tobacco, and formalin were used in the houses after closing all apertures, but it was found that the tropical house with its verandahs did not lend itself well to such a mode of disinfection. To prevent**

mosquito reproduction, the usual method of filling and draining stagnant pools and the secure covering of wells and household cisterns was adopted.

Under this system of preventive measures the epidemic was stamped out, for only one case occurred after its institution and this must have been infected at an earlier date.

C. M. W.

NOC (F.). **Prophylaxie de la Fièvre Jaune et Travaux d'Assainissement de la Martinique.**—*Rev. d'Hyg. et de Police Sanitaire.* 1912. July 20. Vol. 34. No. 7. pp. 754-780.

This paper contains a detailed account of the measures adopted to check the spread of yellow fever in Martinique, where the disease is endemic and always appears in epidemic form when the Stegomyia becomes abundant. The island by reason of its geographical position is described as one of the chief sanitary barriers for the waters of Central America and the Panama Canal. The measures are those usually employed in combating the disease and are carried out under the direction of the Institute of Hygiene and Microbiology which is of official status and well supported by the government in its undertakings. Details of the staff employed in the administration are given and the various ordinances drawn up by the Government on the advice of the Institute are appended. The preventive measures consist in the early identification and screening of the cases, dealing with the breeding places of Stegomyia, the inspection of public lodging houses, boarding schools, and similar institutions where many individuals sleep under one roof, and education of the public to an appreciation of the reasons for the prophylactic measures. To prevent the transportation of the disease by ships calling at the ports, it is laid down that should cases occur on shore no person on board any ship is allowed to sleep on shore, or to be there at any other time than between 7 a.m. and 5 p.m.

It is pointed out that the measures employed against yellow fever are at the same time prophylactic against other diseases such as malaria and typhoid fever.

C. M. W.

BERTARELLI (E.). **Risultati della Profilassi contro la Febbre Gialla dopo Dodici Anni di Applicazione.** [Results of Prophylaxis against Yellow Fever after Twelve Years' Experience.]—*Gazz. d. Ospedali e d. Cliniche.* 1912. July 23. Vol. 33. No. 88. pp. 913-914.

It is pointed out that in South America and elsewhere the prophylactic measures adopted against yellow fever have had most satisfactory results. The measures are roughly—

(1) Compulsory notification of even suspected cases; (2) isolation of these in mosquito proof wards; (3) immediate occlusion of all windows and other apertures in the house from which the case has come and the destruction of the imprisoned mosquitoes by

some suitable gas; (4) the prevention of pools of water, petrolisation, covering of water supplies, etc.

In Cuba in Havana city, in which the preventive measures were instituted in 1901, the deaths from yellow fever had been from 400-600 per annum. From 1901-1903 the death rate diminished very rapidly; in 1904 no deaths were recorded, in 1905 only one, and since then none. In Brazil prophylactic measures commenced in 1903 in the States of S. Paulo, Minas Geraes and the Federal District (Rio de Janeiro). In the town of Rio de Janeiro alone in some years there were as many as 2,000 deaths from disease; in 1905 a few deaths were recorded, but by 1906 there were none. In the northern parts of Brazil, where the preventive measures have not been satisfactorily instituted owing to the unhealthy climate, the scattered population, and other causes, the death rate from yellow fever is still high. Equally satisfactory results have followed the adoption of prophylactic measures in other countries.

C. M. W.

HARVEY (Christopher). **Epidemics of Yellow Fever at Bermuda.**—*Yellow Fever Bureau Bull.* 1912. July. Vol. 2. No. 1. pp. 13-73. With 1 map.

This is a paper of sixty pages which was written by the author in 1879, long before the discovery of the mode of spread of yellow fever. Consequently many of the conclusions are antiquated and erroneous. A detailed account of eleven epidemics is given. They occurred between the years 1699 and 1879 and the author endeavours to show that in every instance the disease was introduced to the colony *ab extra* by the arrival of a ship which had in some way been connected with epidemics of the disease in the West Indies and America.

C. M. W.

BLACKWATER FEVER.

FINK (Lawrence G.). **Blackwater Fever in Burma.**—*Jl. Trop Med. & Hyg.* 1912. March 15. Vol. 15. No. 6. pp. 81-88; and Oct. 1. No. 19. pp. 289-291.

In the first paper an account is given of five cases of blackwater fever. The geographical distribution of this disease, therefore, now includes Burma. The importance of ascertaining the distribution of malaria accurately and definitely in each province in India is pointed out. The author discusses the relationship between malaria and blackwater fever. According to DEADERICK, haemoglobinuric fever stands etiologically in the same relation to malaria as do tabes and dementia paralytica to syphilis, and so may very properly be regarded as a "paramalarial" infection. Malaria seems to be the essential cause of blackwater fever.

Blackwater fever has occurred in four districts in Upper Burma between 23° and 26° 30′ north latitude. Europeans and Indians, recently arrived, have chiefly been affected. As regards prophylaxis the author advises the reduction of cases of malaria by the use of quinine and gives a table showing the great decrease in malaria in a battalion of soldiers after prophylactic precautions.

In the second paper an account of nine cases of blackwater fever is given, and the author gives a summary of all the cases collected. It is evident from the figures that this disease occurs in several districts in Burma, and that Europeans, especially those on forest duty in very malarial districts and exposed to wet and chill, have suffered to a large extent.

J. G. Thomson.

JAMES (H. M.). **Comments upon Dr. Lawrence G. Fink's Article on Blackwater Fever, of September 15, 1911.**—*Jl. Trop. Med. & Hyg.* 1912. Oct. 1. Vol. 15. No. 19. p. 292.

The author points out that CRAIG's account of the geographical distribution of blackwater fever is decidedly erroneous; especially is he in error as to the prevalence of malaria and blackwater fever in India, and in Italy.

MARCHIAFAVA and BIGNAMI have defined blackwater fever as a syndrome that occurs in the course of a malarial infection, and the author thinks they are correct in this definition. He does not agree with these authors when they state that quinine cures some cases of the disease. We are unable, he writes, "to classify the result of quinine administration in blackwater, otherwise than to say that in some instances blackwater undoubtedly followed the use of the drug."

The author points out that parasites and pigment very rapidly disappear when once haemoglobinuria has set in. The value of early and abundant administration of quinine as a prophylactic against the development of haemoglobinuria in malarial cases was well shown in the report of ZEIGLER of the U.S. Navy. At present blackwater fever is seen in Ancon hospital in about one per cent. of the cases admitted for malaria. It occurs in those who have been severely affected by malaria and not in new comers.

J. G. T

WOLDERT (A.). **Microscopic Findings in Twenty-four Cases of Malarial Hemoglobinuria.**—*New York Med. Jl.* 1912. Sept. 28. Vol. 96. No. 13. pp. 634-637.

Observations of a series of twenty-four cases of haemoglobinuria showed that at the onset of the paroxysm the urine, within a few hours, changed from the normal colour to a dark red, due to the presence of haemoglobin. This red colour did not depend on the presence of red blood corpuscles. None of a series of seventeen cases examined could be called haematuria. In eight of the seventeen cases red blood corpuscles were absent from the urine; in seven cases, and in two doubtful instances in which red blood corpuscles were found, they were never present in numbers sufficient to cause the portwine colour of the urine. No haemorrhages occurred from the kidneys. The reaction of the urine was in almost every instance acid; neither glucose nor indican was ever found, and no bile was detected.

There was a very large amount of albumin present, and also a great quantity of destroyed haemoglobin; in some instances the amount of albumin and blood colouring matter present after boiling amounted to 50 per cent. of the entire bulk of the urine. In some specimens of urine, bodies were found composed of uric acid; these were round and concentrically arranged, 10 to 40 microns in diameter, and often contained a dark brown dot or apparent nucleus. Bright red crystals of haematoidin were frequently found. Of the seventeen cases examined hyaline and granular casts occurred in seven, and were absent in ten. In nine of the seventeen, bodies like tube casts made up of disintegrated blood colouring matter, were found. No evidence was obtained to indicate that nephritis developed as a result of the haemoglobinuria.

J. G. T.

PICHOT. **Un Cas de Fièvre Bilieuse Hémoglobinurique observé à Diré-Daoua (Abyssinie).** [Clinique d'Outre-Mer.]—*Ann. d. Hyg. et Med. Colon.* 1912. July-Aug.-Sept. Vol. 15. No. 3. pp. 617-618.

It is generally believed, the author says, that blackwater fever does not exist in Abyssinia. As malarial fever is common in this region there seems no reason why cases of haemoglobinuria should not occur. A description of a typical case of blackwater fever is given. The patient had suffered from several attacks of malaria over a period of several years, and before the attack of haemoglobinuria had taken no quinine for several days. The urine was the colour of Malaga wine and spectroscopic examination showed the presence of haemoglobin. The patient was jaundiced and vomited bile-stained fluid. An injection of 250 cubic centimetres of Hayem's serum was given the day after the attack; four days later the temperature fell, the urine was free from haemoglobin, and the patient rapidly recovered.

J. G. T.

Skelton (D. S.). A Case of Blackwater Fever and a Suggestion. *Jl. R. Army Med. Corps.* 1912. Oct. Vol. 19. No. 4. pp. 457-460.

The case described in this paper is remarkable in that no less than five years and eight months had elapsed since the patient left the West Coast of Africa, where he had a severe attack of the same disease. Except for a few doses of influenza mixture [? composition], he had taken no quinine for all this time; and in any case no quinine had been taken for four months. This, the author considers, rules out quinine as an invariable factor in the production of blackwater fever. The case was a typical mild attack of haemoglobinuria, such as paludics not uncommonly get on returning to England. The author thinks that in the case described here we have a malarial infection, the recrudescence of which can only be due to the parasite redeveloping by parthenogenesis.

He thinks it can be conceived that the large parthenogenetic forms of the *P. malariae*, containing as they do a large amount of nuclear matter and pigment, are so intensely toxic in their products as to give rise to the condition of blackwater.

J. G. T.

Leishman (William). The Etiology of Blackwater Fever.—*Trans. Soc. Trop. Med. & Hyg.* 1912. Nov. Vol. 6. No. 1. pp. 1-20. With 1 plate.

Sir William Leishman first gives a review of the various hypotheses and observations on the etiology of blackwater fever, with a view to arriving at the points or factors which may be taken as established and upon which there is practically universal agreement. In the second part of his paper he describes the bodies encountered by himself in the leucocytes.

He draws attention to the acute differences of opinion on the etiology of blackwater fever. He groups all the hypotheses under one of the following four heads:—

(1) That blackwater fever is a manifestation of active malaria; (2) That it is quinine poisoning; (3) That it is due to a specific organism; (4) That it is a result of a condition brought about by previous malarial infection.

The first of these is little advocated to-day, and whatever influence malaria may have it is clear that it cannot alone be held responsible for haemoglobinuric fever.

Quinine poisoning as an essential cause is still a matter of debate. Sir Patrick Manson has recorded cases where attacks of haemoglobinuria could be produced at will by the ingestion of even a small dose of quinine. **Ketchen** quotes a case where a series of seven attacks of blackwater were induced in the same individual; each attack was the sequel of a dose of quinine. The author quotes several strong points against its being due to quinine alone. The following are well established:—

"(i.) No cases have been recorded in non-malarious countries in which quinine, given for some other disease, has caused blackwater fever. (ii.) Numerous well-authenticated cases are on record in which blackwater fever developed in individuals who had either never had quinine at all, or who had had none for a considerable time before the attack. (iii.) A man may have an attack of blackwater fever subsequent to a dose of quinine, and yet may afterwards take even large doses of the drug with impunity. (iv.) There appears to be no relation between the size of the dose, the channel of administration or the particular salt employed, and the attack, although each of these has at times been suggested as the essential factor."

As to the third view, namely that the disease is caused by a specific virus, there is at present no proof. **Sambon** has suggested that there may be an organism analogous to a piroplasma.

The last view is most generally accepted, namely that blackwater fever, although not actually a manifestation of malaria, is a condition brought about by previous malarial infection. The excellent work of **Deeks** and **James** supports this hypothesis. The conclusions of these observers were as follows:—

"(1) Haemoglobinuric fever is a manifestation of malarial toxicity, for the most part brought about by repeated attacks of malaria. (2) It may appear coincidently with an acute malarial paroxysm. (3) It may be determined by any depressing influence. (4) It may be induced by the administration of quinine. (5) Quinine alone, or malarial infection alone, do not cause haemoglobinuria, but one or both of these conditions, plus the toxin eventuated during the course of one or more malarial attacks."

These authors also give the conditions most favourable for the production of haemoglobinuric fever; these are as follows:—

"(1) The presence of a population non-immune to malaria. (2) The prevalence of malaria in such quantity as to produce an almost continuous infection of this population. (3) A large proportion of aestivo-autumnal malaria; because the amount of blackwater fever is in direct proportion to the intensity of this variety. (4) The neglect of prompt and continuous administration of quinine, especially in primary attacks, to persons non-immune against malaria."

Various factors are given as the exciting causes of blackwater, namely, exposure, cold, damp, fatigue or over exertion, change of residence. Rarer exciting causes are mentioned. The most common exciting causes seem to be exposure to cold, and the exhibition of quinine.

Christophers and **Bentley** show that the haemolysin is probably derived as a result of auto-immunisation against the individual's own red cells. **Barrett** and **Yorke** have shewn that quinine cannot be held responsible per se, since it would have to be present in the blood in a toxic dose before haemolysis could be produced; they believe that haemoglobinuria is the result of an antecedent haemoglobinaemia and that the anuria is due to mechanical blocking of the urinary tubes. **Cleland's** recent theory is, that in the phenomenon of haemolysis we have an expression of an anaphylactic condition.

Sir William Leishman concludes the first part of his paper with the following summary of what might be recorded as well established points.

"1. Blackwater fever is only encountered in those who have either suffered from malaria or who have lived for some time in a country in which they must constantly have been exposed to the danger of malarial infection.

"2. One attack of blackwater fever confers no immunity against further attacks, but negro and other native races inhabiting endemic zones exhibit a certain degree of immunity. Whites and alien natives introduced into

an endemic zone are most liable to the disease, but, as a rule, only after a certain period of residence.

" 3. Immunity to malaria appears to go hand in hand with immunity to blackwater fever, and measures which protect against malarial infection are also prophylactic against blackwater fever.

" 4. The regions of most intense malarial infection are those in which blackwater fever occurs, but there exist also extremely malarious regions in which it is either extremely rare or absent.

" 5. In the majority of cases an exciting cause is needed to produce the haemoglobinuric fever; the most frequent appear to be quinine and exposure to cold.

" 6. The precise mechanism of the sudden and extensive haemolysis is not yet fully understood; there is certainly no direct relationship to the number or severity of the antecedent attacks of malaria, or to the number of malarial parasites present at the time of the attack."

In the second part of his paper the author gives a description of the cell inclusions found in the large mononuclears, which he thinks may be chlamydozoal in nature, and he also describes the "chrome cells" (see this *Bulletin*, No. 1, pp. 29-31). Sir William at first thought these were in some way connected with the inclusions, but since the publication of his first note he has received from D. THOMSON of the Liverpool School of Tropical Medicine a communication in which the latter stated that he had observed similar cells in several different conditions, such as Hodgkin's disease, myelogenous leukaemia, carcinoma of the ileum, blood from leprosy nodules, and one or two others.

The author concludes with an examination of the conclusions reached in the first portion of his paper in the light of the chlamydozoal hypothesis.

(1) He suggests that the association of blackwater with malaria is comprehensible if it is assumed that the chlamydozoal virus is one which is transmitted either by mosquitoes or some different insect whose geographical distribution is similar. Mosquitoes transmit at least four diseases and of these yellow fever and dengue are due to filter-passing viruses.

(2) The second conclusion, referring to the immunity of natives in endemic areas, is not inconsistent with the new hypothesis if it is assumed that immunity follows the same lines in the two diseases.

(3) The conclusion that immunity to malaria appears to go hand in hand with blackwater fever supports the idea that the virus of the latter is also transmitted by a biting insect, similar in its habits to the mosquito.

(4) The fourth conclusion, which pointed out the discrepancies in the geographical distribution of the two diseases, and that blackwater fever only occurred in intensely malarious countries, is explained by assuming that some insect resembling the mosquito in its life habits transmits the specific virus; this insect must be either less numerous or not so widely distributed.

(5) The fifth conclusion that some exciting cause is needed, and lastly, (6) the conclusion relating to the mechanism of the production of haemolysis, both appear to await further understanding and explanation.

In conclusion the author suggests another possible connection between malaria and blackwater, namely the possibility of the malarial parasite itself being subject to disease.

J. G. T.

PROTOZOOLOGY.

MINCHIN (E. A.). **An Introduction to the Study of the Protozoa with Special Reference to the Parasitic Forms.** pp. xi. + 520. With 194 Text-figures and Bibliography. Demy 8vo. 1912. London: Edward Arnold. [21*s*. net.]

This text-book, written in Professor Minchin's well known facile style, marks an advance in Protozoology in England, as it is the first attempt by an Englishman to deal on a broad scale with the Protozoa.

The book can be divided into two parts. The first part, which consists of ten chapters, deals with the Protozoa from the biological and cytological point of view, and while of the greatest interest and charmingly written, it is probable that the second part (eight chapters), which gives a systematic review of the Protozoa, will appeal more to the worker in the tropics, who comes face to face with the organisms themselves. Hence this aspect is considered here somewhat more fully, though the first part will amply repay a careful perusal.

The nutrition of Protozoa, and especially of parasitic forms, is necessarily of economic importance. The organisms are considered under four types—(1) holozoic, (2) holophytic, (3) saprophytic or saprozoic, and (4) parasitic, and the inter-relation of host and parasite is discussed. The organisation of Protozoa, their structure, mode of life, provision for locomotion, excretion and sensitiveness are all described and illustrated. The physical and chemical constitution of the nucleus and nuclear bodies is discussed and interesting speculations as to the primitiveness or otherwise of chromation are dealt with at some length. The modes of reproduction of the Protozoa are detailed; this is highly important to workers concerned in the restriction of tropical diseases and in the elucidation of the cause of progress or relapse in individual maladies. The sex problem is one of the most speculative and controversial among some of the Protozoa, and a chapter is devoted to it. Professor Minchin states that while "sexuality is a universal attribute of all living beings above the rank of the Protista", it has not been observed with certainty among Bacteria and by no means among all the Protozoa. Syngamy (or sexual union) greatly increases the powers of recuperation possessed by the Protozoa. The necessity for syngamy can be greatly reduced by change of environment, and parthenogenesis and autogamy can replace it. The value of syngamy lies in keeping the tendency to variation within specific limits. Perhaps the subject of polymorphism is of greater practical importance to the worker in the tropics. Polymorphism may be due to either adaptation to environment, to growth and development, or to sex manifestation. Developmental forms of Protozoa also may be recapitulative as well as adaptive. The first part of the book closes with an interesting chapter on the general physiology of the Protozoa.

The second portion of the book consists of a systematic review. Two fundamental types of Protozoa are recognised: (1) The Sarcodine type and (2) the Mastigophoran type. The various classes are then considered in some detail.

The Sarcodina are treated under two sub-classes: (a) The Rhizopoda, comprising the Amoebaea, Foraminifera, Xenophyophora and Mycetozoa, and (b) Actinopoda, including the Heliozoa and Radiolaria. The group Amoebaea is of most interest to the tropical worker as it includes the pathogenic agents of amoebic dysentery. "The entozoic amoebae are commonly placed in a distinct genus, *Entamoeba,* distinguished from the free living forms by little, however, except their habitat and the general (but not invariable) absence of a contractile vacuole." The life-cycle of *E. coli,* illustrated by CASAGRANDI and BARBAGALLO's figures, is given in some detail and Prof. Minchin considers that *E. coli* "is not, under normal circumstances at least, a parasite in any sense of the word, but a simple scavenger, feeding on bacterial and other organisms, detritus, etc., in the colon and rectum." *E. histolytica* also is described, but illustrated only by JÜRGENS' figures—a pity when better and more modern ones are available. *E. tetragena,* which is of increasing importance, is not illustrated. This lack of illustrations will doubtless be remedied in a subsequent edition. The culturability of Amoebae is discussed at some length.

Among the Mastigophora, the sub-class Flagellata or Euflagellata is the most important. Their modes of life are discussed in great detail, and an interesting account of their methods of nutrition is given. *Lamblia intestinalis,* possibly a causal agent of diarrhoea, is well illustrated. The general classification of the Euflagellata is set forth.

The Haemoflagellates and allied forms, comprising HARTMANN's so-called Binucleata, are considered under the generic types *Trypanosoma, Trypanoplasma, Crithidia, Leptomonas* (*Herpetomonas*), *Leishmania,* and *Prowazekia.* Twenty-six pages are devoted to Trypanosomes, and their structure, movements, life-history and effects on the hosts are discussed. The life-cycles of *T. lewisi* and of *Schizotrypanum cruzi* are described in detail and well illustrated. The life-history of *T. gambiense* is summarised so far as it was known in 1911. The typical life-cycle of a trypanosome in an invertebrate is considered to consist of three phases: (1) an initial multiplicative phase, (2) a crithidial phase, (3) a propagative, trypaniform phase. Prof. Minchin does not consider that the "granule" phase as described by FRY is a normal occurrence in the development of trypanosomes—a view accepted by the majority of workers on the subject. The genus *Crithidia* is shortly dealt with, but it is to be regretted that the statement on page 313 that, "up to the present . . . . no blood-sucking insect has been proved satisfactorily to harbour flagellate parasites not derived from vertebrate blood," is not in accord with the results of recent research.

The genera *Leishmania* and *Prowazekia* are discussed in some detail. Each chapter in the systematic portion closes with a statement of Prof. Minchin's ideas on the phylogenies and affinities of the various groups under consideration.

The Sporozoa are considered under two sub-classes, Telosporidia and Neosporidia. The Gregarines and Coccidia are well described and illustrated. The life-cycle of *Coccidium schubergi* is given and that of the interesting *Selenococcidium* is figured.

Among the Haemosporidia five principal types are treated in detail: (1) Haemamoeba type, (2) Halteridium type, (3) Leucocytozoon type, (4) Haemogregarine type, and (5) Piroplasma type.

The Haemamoebae include all the malarial parasites and the Proteosoma of birds, which are discussed in detail. The life-cycle diagram of *Haemoproteus columbae* is given. *H. stepanowi* is the type of haemogregarine considered, and the remarkable (but unconfirmed) work of MILLER on *Hepatozoon perniciosum* is summarised. The piroplasms are classified according to FRANÇA'S structural varieties, and their development in the invertebrate hosts is discussed.

The Neosporidia are divided into Cnidosporidia and Haplosporidia. The former include Myxosporidia, Actinomyxidia, Microsporidia, and Sarcosporidia. Spore formation in the Myxosporidia is well illustrated. *Nosema bombycis* of pébrine is fully treated, and a good modern account is given of the Sarcosporidia. A summary, particularly of use to workers in the tropics, is given of *Rhinosporidium*.

The Infusoria are grouped as (1) Ciliata and (2) Acinetaria or Suctoria. The free living forms are fully described and very well illustrated. An interesting discussion of the affinities of the Ciliata indicates that it is highly probable that they are descended from flagellate ancestors.

The concluding chapter deals with the affinities and classification of the Protozoa and includes a brief note on the Spirochaetes. It is to be regretted that these highly important and difficult organisms are not more adequately treated and better illustrated. The increasing importance of the Chlamydozoa is recognised by a good, but unillustrated account of those organisms. The book of 520 pages includes a bibliography of 30 pages and contains 194 text figures.

Such is a brief, and necessarily inadequate, review of a very interesting volume.

H. B. Fantham.

BRUMPT (E.) & JOYEUX (Ch.). **Sur un Infusoire Nouveau Parasite du Chimpanzé *Troglodytella abrassarti*, n.g. n.sp.**—*Bull. Soc. Path. Exot.* 1912. July. Vol. 5. No. 7. pp. 499-503. With 1 plate.

The authors found a new Infusorian belonging to the *Ophryoscolecidae* in the faeces of an adult female Congolese chimpanzee. Many parasites occurred in faeces neutral to litmus.

The average size of the Infusorian was 196·22μ by 115·11μ. Small ones measured 145μ by 87μ. The orientation of the parasite is difficult; the peristome determines the ventral surfaces. The body possesses four incomplete rows of thick, slightly motile cilia.

A digestive tube occurs with a lining of the same constitution as the external cuticle. The mouth possibly occurs at the junction of the peristome with the pseudo-intestinal tube; in the latter starch grains have been observed, also faecal pellets at the cytopyge (cell-anus) which is situated at the summit of the 4th ciliated row. No contractile vacuole is present.

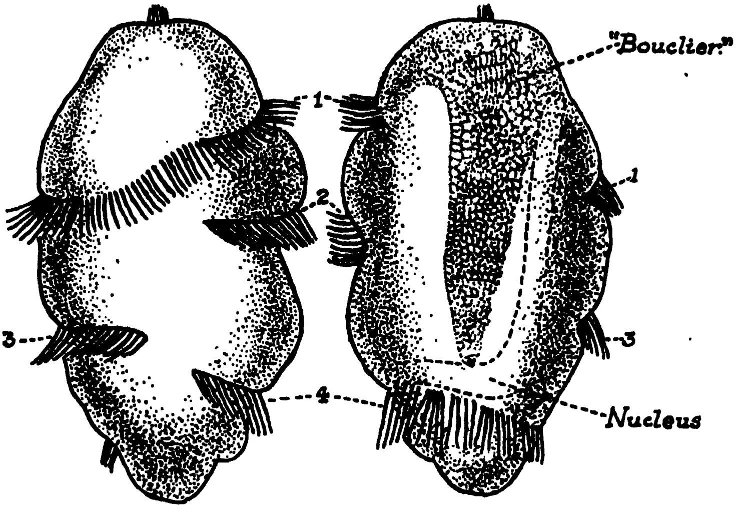

Fig. 1. *Fig. 2.*

Troglodytella abrassarti Brumpt & Joyeux. Fig. 1 : ventral surface. Fig. 2 : dorsal surface. The numbers indicate the rows of cilia.

The macronucleus is shaped like an inverse S or L. There is no micronucleus. The endoplasm contains a cuticular supporting lamella, triangular in shape, and continuous with the shield (*bouclier*).

Asexual reproduction only is known. Division is transverse and fairly common.

The authors were unable to subinoculate the parasite into cats and monkeys. The parasite is rare in the chimpanzee and was found at autopsy to occur from the caecum to the anus.

The diagnosis of the genus *Troglodytella* given by the authors is:—

Ophryoscolecid, ovoid, posterior extremity not pointed, showing a thickened cuticular part (*bouclier*) on the dorsal surface prolonged into the cytoplasm as a sustentacular stalk. The body has four incomplete rows of large cilia. Type species *Troglodytella abrassarti*, Brumpt and Joyeux, July 1912.

H. B. F.

NAKANO (J.) **Wie verhalten sich die Kurloffzellen des Meerschweinchenblutes bei protozoischen Infektionen?** [The Behaviour of Kurloff's Bodies in Guinea-pigs' Blood in Protozoal Infection.]—*Folia Haematologica.* 1. Teil. Archiv. 1912. August. Vol. 14. No. 1. pp. 43-60.

The author commences with a historical résumé of the forms of leucocytes found in the blood and of the occurrence of Kurloff's bodies. His own work was based on observations of three guinea-pigs, one of which was infected with *T. brucei*, two with *T. gambiense*. The animals were examined daily and detailed tables of the percentages of the various forms of leucocytes in the blood, the proportion of Kurloff's bodies present, the relative degree of infection of trypanosomes, and remarks thereon, are given. Curves demonstrating the daily variations of the different elements and of the Kurloff's bodies, are also given. A second series of curves shows the relation of Kurloff's bodies to the large lymphocytes.

The author's conclusions are as follows:—

(1) Neutrophile leucocytosis occurs in sleeping sickness in guinea-pigs and the number of lymphocyte cells undergoes reduction. This relation is reversed in nagana.

(2) In nagana of guinea-pigs the large lymphocytes are apparently the specific reactive or protective cells, while in sleeping sickness the polynuclear leucocytes are such.

(3) In various forms of experimental trypanosomiasis, whether lymphotactic or leucotactic, the Kurloff bodies gradually disappear from the blood and spleen, first increasing or diminishing in the blood in inverse ratio to the appearance of trypanosomes. No correlation exists between their decrease in the blood and increase in the spleen. The Kurloff bodies have apparently no direct connection with immunity processes.

(4) Kurloff's bodies show no morphological change resulting from protozoal injection of the host.

(5) Increase and decrease of Kurloff's bodies bear no relation to the increase and decrease of the azure granules in the small lymphocytes.

(6) Eosinophile leucocytes diminish in numbers in sleeping sickness of guinea-pigs; mast-cells increase to some extent in nagana.

H. B. F.

MARULLAZ (M.). **Sur une Hémogrégarine de *Drymobius bifossatus* (Raddi).**—*Compt. Rend. Soc. Biol.* 1912. Nov. 29. Vol. 73. No. 33. pp. 518-520.

The author considers that the organism serving as a basis for the description of *Drepanidium serpentium* (A. Lutz, 1901) was the haemogregarine of *Eunectes murinus*.

He examined the blood of two Brazilian serpents, *Drymobius bifossatus*, and found them parasitised by haemogregarines. He describes small, medium and large forms in the red blood cells. The larger forms are encysted therein. Free parasites are somewhat rare and are found more especially in the liver.

Multiplicative forms were found in the lungs and liver. They occur within oval cysts with very fine capsules. The contained merozoites are of two sizes, and are termed macromerozoites (2 to 10 in a cyst) and micromerozoites (16 to 24 in a cyst).

The author did not find "centrosomes" in the haemogregarines. He names the parasites *Haemogregarina drymobii*.

H. B. F.

HENRY (Herbert). **The "Infective Granule" as the Initial Phase in the Life-History of a Haemogregarine. (Preliminary Note.)** —*Brit. Med. Jl.* 1912. Dec. 14. pp. 1654-1655.

The contents of this paper, dealing with highly problematic stages of a haemogregarine (*H. simondi* in the blood of the sole, *Solea vulgaris*) are probably best summarised in the author's own words, thus:—

"While watching the escape of these parasites from infected corpuscles into the surrounding plasma I was struck by the fact that in many of the free haemogregarines one, two, or more bright refracting granules were found to emerge from the nucleus and to make their way through the protoplasm of the parasite to one or other extremity, in the majority of cases to the posterior extremity. In this passage from the nucleus to the posterior extremity these granules frequently divide . . ." "Their liberation into the surrounding blood plasma may be readily observed in films of fresh blood kept between slide and cover-slip, or in films made from blood kept in tubes of Nicolle's blood-agar medium" . . . "Red corpuscles are frequently found containing in their cytoplasm granules which are indistinguishable from and probably identical with the granules extruded from the haemogregarines" . . . "These intra-corpuscular bodies at first consist entirely of chromatin, but as they increase in size there appears round each a small clear zone of irregular outline, which zone later becomes a definitely stained piece of protoplasm. Phases showing this acquisition of protoplasm are met with occasionally in the blood stream, but more often in spleen and in liver smears. Also in spleen and in liver smears these bodies, composed of granules *plus* protoplasm, would appear to increase rapidly in size, so as to give rise to larger oval bodies which are distinctly haemogregarines."

The paper is illustrated by eight text figures.

[In the above paper, where the author compares granules of spirochaetes with those found in a piscine haemogregarine, it should be remembered that analogy is not homology].

H. B. F.

WOODCOCK (H. M.). **Notes on Sporozoa. Nos. ii, iii, & iv.** ii. Observations of *Karyolysus lacertae* (Danil.) and Remarks upon other Haemogregarines of Lizards. iii. Comparison of the Nuclear Condition in Haemogregarines with that in certain Coccidia. iv. The Nuclear Structure of *Leucocytozoon* and *Halteridium*.—*Quarterly Jl. Micros. Sci.* 1912. Sept. Vol. 58. Pt. 1. (New Series No. 229.) pp. 171-240. With 2 plates.

In the space at our disposal it is quite impossible to give a full summary of this long memoir. The protozoologist interested must consult it in the original. However, we would point out that:—

(1) In the first note the author states that there is "a remarkable agreement apparent between the nuclear condition of *Karyolysus* at a certain period of the life-cycle and that of a particular Coccidian in the corresponding phase."

The author "registers a strong protest against the habit of creating a new species on entirely insufficient grounds."

(2) In the second note, the author concludes that the Haemogregarine nucleus is not a distinct type but shows close agreement with the Coccidian nucleus.

(3) Lastly, in dealing with the nuclear structure of *Leucocytozoon* and *Halteridium,* the author discusses the significance of the so-called binucleate condition in these forms. He concludes that—

> "In *Halteridium* the karyosome retains its central position within the nucleus throughout the period of growth of the gametocyte, and does not pass to the outside until the parasite is full-grown. On the other hand, in *Leucocytozoon* the karyosome appears to be always at the edge of, or else outside the nucleus." . . . . "In *Halteridium* the prominent extranuclear body is the karyosome of the nucleus."
>
> "The association of *Halteridium* and *Leucocytozoon* (and also, in all probability, of *Proteosoma* and the malarial parasites) along with the Haemoflagellates in the group Binucleata has therefore to be given up. These Haemosporidia, equally with the Haemogregarines, must be regarded as closely allied to the Coccidia; it seems to me that there is no longer any reason for supposing that they are derived from a binucleate form, such as a Haemoflagellate. It has been a great disappointment to me to find that the view so elaborately worked out by Schaudinn and apparently so firmly based on facts, which I in common with many other Protozoologists adopted enthusiastically, has had to be abandoned, step by step, until the entire edifice is seen to be without any true foundation whatever."

There are figures of *Karyolysus lacertae, Leucocytozoon ziemanni, Halteridium noctuae* and *H. fringillae.*

H. B. F.

Yakimoff (W. L.). **Trypanosomes Parasites du Sang des Poissons Marins.**—*Arch. f. Protistenkunde.* 1912. Oct. 5. Vol. 27. No. 1. pp. 1-8.

The author gives a brief outline of the work on the trypanosomes of fish from 1841 to the present time.

He lists the fish examined by him at the Zoological Station of Naples during the winter of 1909-10. Two trypanosomes are described and figured:—(1) *Trypanosoma dorhni,* n. sp. in *Solea monochir* (one figure). (2) *Trypanosoma yakimovi* from *Syngnatus.* There are 8 figures of this parasite.

H. B. F.

SLEEPING SICKNESS.

TRANSMISSION.

RODHAIN (J.), PONS (C.), VANDENBRANDEN (J.), & BEQUAERT (J.). **Essais de Transmission du** *Trypanosoma gambiense* **par la** *Glossina morsitans.—Bull. Soc. Path. Exot.* 1912. Nov. Vol. 5. No. 9. pp. 762-770.

The experiments described in this note were made at Sankisia in Southern Katanga at a height of 750 metres (2,450 feet). Along the neighbouring watercourses *G. palpalis* and *G. morsitans* exist side by side, and sleeping sickness occurs. At Sankisia itself *G. morsitans* alone is found. *G. morsitans* bred from pupae were used. Eleven attempts at transmission were made with trypanosomes from six different patients; three were successful. Of these experiments four were made with flies which had fed directly on three natives with scanty trypanosomes in their blood; in others the flies were fed on an infected goat, a dog, or a guinea-pig; and in the three successful experiments on infected monkeys (*Cercopithecus*). The experiments are detailed. Of 81 flies used in the three successful experiments 63 lived at least thirty days and three became infective, that is to say, a proportion of 4·76 per cent. The details of the experiments do not differ from those given by other workers. In one case the infective fly was killed after 92 days; there was a typical infection in the salivary glands and three trypanosomes were found in the hypopharyngeal tube. In another experiment after the infective feed the flies were fed on a baboon for three weeks. In this case again trypanosomes were found in the salivary glands of the infective fly and a few in the hypopharyngeal tube. In the successful cases the trypanosomes were derived from two patients: in one instance the virus was of the Congo type; concerning the other the authors are uncertain.

Certain conclusions are formulated. It is noted that in the two infective flies examined there was no sign of multiplication of parasites in the proboscis; the trypanosomes found in the hypopharynx are believed to have come from the salivary glands. The latent periods in the flies were respectively 30, 35, and 24 days, which, it is noted, correspond with the times given by BRUCE and by TAUTE, but are more than those found by KINGHORN and YORKE. It is noted that feeding on the blood of a refractory animal, the baboon, did not prevent the completion of the cycle of development. The authors write that in villages on the river Fungwe, near which *Glossina palpalis* is very rare or absent, the population has been decimated by trypanosomiasis; *G. morsitans*, which abounds there, may be playing an active part in the spread of the infection. The authors have not tried to infect monkeys with wild *G. morsitans*; their supply of laboratory animals is insufficient.

A. G. Bagshawe.

ROBERTSON (Muriel). **Notes on the Life-History of** ***Trypanosoma gambiense*****, etc.** (Abstract.)—*Proc. Roy. Soc.* 1912. Dec. 17. Series B. Vol. 86. No. B 584. pp. 66-71.

It is noted that this paper is of the nature of a brief synopsis and is not a full account of the experiments and conclusions.

Endogenous Cycle in the Blood.—The author refers to the marked fluctuation in the numbers of parasites present in the blood—the observations were made on monkeys—and to the wide range in the type of individuals. The short forms, to be looked upon as the adult blood type, appear to be responsible for carrying on the infection in the fly; the blood of a monkey is only infective to fly when these forms are present in sufficient numbers and in a suitable physiological condition, that is, not suffering from exhaustion. The differentiation into long and short forms is a phenomenon of growth and division and not an expression of sex.

Exogenous Cycle in the Fly.—Though the series of changes undergone in the fly up to the time when it becomes infective to clean vertebrates is very definite and constant, the duration in time of this cycle varies in different cases within the limits of more than a fortnight [? at the same temperature]. The trypanosomes never attach themselves while in the gut; they never disappear from this situation. The parasites never enter the body cells of the host nor do they penetrate through the gut wall into the body cavity. The changes in the fly are described and figured. The first divisions in the gut are remarkable in that they show a suppressed crithidial phase in the young individual. This disappears before the separation of the two products. The stages in the gut do not show any other crithidial phase. Development usually starts in the middle or posterior intestine and is rapid. It is noted that division is not longitudinal, but practically transverse, and it is often unequal. About the 8th to the 18th day very slender long forms develop and pass forward into the proventriculus. This type is the proventricular form and is the culmination of the development in the gut. Proventricular forms injected into clean monkeys do not produce infection. The multiple forms, seen up to the 10th or 15th day, are regarded as degenerative stages, but some may be capable of developing further.

With regard to the invasion of the salivary glands the author writes:—

"The long slender forms from the proventriculus come forward into the hypopharynx in small numbers at a time and may be found lying free in this situation in carefully dissected specimens before the glands are infected. From the hypopharynx they pass back along the narrow ducts of the salivary glands and it is not at all a rare occurrence to find trypanosomes in the ducts of the glands in 16- to 30-day flies when the rest of the glands show no flagellates at all. The trypanosomes reach the glands as long slender forms and attach themselves where the duct joins on to the slightly broader part which leads to the glandular portion proper. They become much shortened and very much broader and assume the crithidial condition shown in figs. 16–21. They break free occasionally but seem to attach themselves again. Multiplication occurs and the trypanosomes gradually invade the whole gland; new specimens keep on arriving from the hypopharynx. The short dumpy crithidial forms develop into trypanosomes almost indentical with the blood-forms but often a little below the normal adult length. These trypanosomes are found swimming free in the lumen of the glands and there is the strongest presumptive evidence for considering that these are the types that produce the infection in the vertebrate."

The development in the glands, the author writes, is the essential part in the whole cycle, the development in the gut being regarded as a mechanical device to enable the trypanosomes to establish themselves in sufficient numbers in contact with the salivary fluid, "which alone in the Glossina seems able to stimulate the trypanosomes to the apparently essential reversion to the crithidial type." Sexual differentiation has not been observed, but is not a characteristic of flagellate life-histories, isogamy being usual. It seems possible that the sexual part of the cycle might take place in the salivary glands. The author notes that there are no serious discrepancies between the cycle in the fly sketched by BRUCE, HAMERTON and BATEMAN and that described by her. She does not think the 'male' forms of KLEINE and TAUTE play any important part.

A. G. B.

KINGHORN (Allan), YORKE (Warrington), & LLOYD (Ll.). **On the Development of** *Trypanosoma rhodesiense* **in** *Glossina morsitans.*—*Ann. Trop. Med. & Parasit.* 1912. Dec. 30. Vol. 6. No. 4. pp. 495-503.

The method of dissection of the flies has been previously described (see *Sleeping Sickness Bulletin* Vol 4. p. 235). The salivary glands attached to the pharynx are drawn out through the waist, so that the only lesion of the alimentary canal occurs in the anterior portion of the oesophagus; the danger of contamination from the intestine is thus reduced to a minimum. The authors found that in every fly capable of infecting animals with *T. rhodesiense* the salivary glands were invaded. 132 laboratory-bred *G. morsitans* used in transmission experiments were dissected as they died. Five were capable of infecting animals. In each there was an enormous invasion of the salivary glands by trypanosomes. In the 127 flies which remained incapable of transmitting the parasites the salivary glands were not involved, though trypanosomes were found in the intestine of 22. Data of the 27 flies in which trypanosomes were found are given in a table, showing the day of dissection after the infecting feed and the presence or absence of trypanosomes in the proboscis, intestine, and salivary glands. Trypanosomes were found in the proboscis in six instances between the 15th and 22nd days; in three of the infective flies they were not found (28th-40th days). The experiments with wild *G. morsitans* gave similar results. Of 620 flies dissected trypanosomes were found in the salivary glands of fourteen; all except four of these were proved to transmit the human trypanosome; in the case of the four the animals fed on died before a diagnosis could be made. None of the flies in which the salivary glands were not invaded was able to infect animals. Confirmatory evidence was obtained from the

G. morsitans caught in nature and fed on healthy monkeys. In all, twenty *G. morsitans* were found to have trypanosomes in their salivary glands and of these sixteen were definitely shown to be capable of infecting animals with *T. rhodesiense.*

The authors say that there was no doubt of the parasites being actually in the lumen of the tubes of the salivary glands. It was evident in fresh preparations, and in glands which were fixed after removal and subsequently embedded and cut the parasites could be seen inside the glands. In a fly which died on the twelfth day after being fed on a guinea-pig infected with *T. rhodesiense* a number of cysts containing trypanosomes were found in the mid gut; some had thin, others thicker walls; they ranged in diameter from 27 to 32μ.

It was found that on every occasion on which the salivary glands were infective the trypanosomes in the intestine were also virulent. This is strikingly shown in a table. In seven instances in which the salivary gland contents were introduced into animals and infected them the gut contents also were shown to be infective.

The authors write:—

> "The manner in which the salivary glands become infected is uncertain, but there is a certain amount of evidence which would cause one to believe that it is secondary to the intestinal infection, and that it only occurs when the trypanosomes in the gut have reached a certain stage of development, and only then when the conditions of temperature are suitable for the further development of the parasites....................
>
> "In none of our experiments were trypanosomes found in the salivary glands of flies which had not been subjected to the higher temperatures. Probably the salivary glands become invaded by parasites which have reached a certain stage in their developmental cycle in the intestine."

Invasion of the salivary glands was only observed in the case of flies infected with *T. rhodesiense* and not in the case of any other trypanosomes the authors met with either in the Luangwa valley or on the Congo-Zambesi watershed. As regards the trypanosomes found in the proboscis, they believe that their presence there is fortuitous, depending on the passage of the infected salivary secretion or on regurgitation from the gut, the result of manipulation during dissection. A description of the parasite as it appears in different portions of the fly is to be given in a further communication. The form in the salivary glands approximates rather closely to the short variety of the trypanosome in mammalian blood, but is not identical with this.

It is noted that of 510 wild *G. morsitans* dissected as they were brought to the laboratory mammalian red blood corpuscles were found in 70 and nucleated red blood corpuscles in four only.

[It will be noticed that Kinghorn and Yorke's account of the cycle of *T. rhodesiense* in *G. morsitans* agrees, as far as it goes, with that of Miss Robertson's for *T. gambiense* in *G. palpalis.* Miss Robertson however does not account for the infectivity of the intestinal forms, which was noted also by the Sleeping Sickness Commission in Uganda.]

A. G. B.

Kleine (F. K.) & Fischer (W.). Schlafkrankheit und Tsetsefliegen. [Sleeping Sickness and Tsetse Flies.]—*Zeitschr. f. Hyg. u. Infektionskrankheiten.* 1912. Dec. 20. Vol. 73. No. 2. pp. 253-259.

The authors recall that about four years ago Kleine showed that *T. brucei* can complete its development in *Glossina palpalis*. It seemed then probable that *G. morsitans* might serve as a host for *T. gambiense*. Experiments were therefore undertaken on the shore of the Victoria Lake. Taute fed a large number of *Glossina morsitans* on sleeping sickness infected monkeys, but did not succeed in transmitting the disease to healthy monkeys. Of 120 flies dissected after 40 days trypanosomes were found in two; these were recognised as stages in the development, but not the terminal stage. It seemed that *T. gambiense* might commence its development in *G. morsitans*, but could not complete it (see *Sleeping Sickness Bulletin*, Vol. 1, p. 449).

Reference is then made to the transmission results of *Bruce and his colleagues in Uganda, Bouffard in Senegal, Bouet and Roubaud in Dahomey, Fehlandt in South Tanganyika, and Fischer in North Tanganyika. It is clear from these that one species of Glossina may serve as host for various species of trypanosomes, and that the individual trypanosome species are in no way associated with individual species of Glossina.

It seemed probable that the negative result of the experiment on the Victoria Lake was occasioned by its height. This lake is about 1,200 metres above the sea, about 400 metres higher than Tanganyika. The Victoria Lake experiment was therefore repeated by Taute on Tanganyika. He used thirteen different human strains, two of which were brought in monkeys from the Victoria Lake. Of seventeen experiments fourteen were successful and it was shown in one experiment that four per cent. of the flies employed became infective (*S. S. Bulletin*, Vol.4, p. 269).

In order to see whether the negative result of the first experiment on the Victoria Lake was due to some undetected error or was the result of a natural law, the experiment was repeated in June, 1912, at the same place and at the same time of year. Six different strains of human trypanosomes were used and 1,402 laboratory-bred *Glossina morsitans*. Of fourteen experiments twelve were negative although they were continued for seventy days; two only were positive. One of these is given in detail. One hundred flies were fed for four days on a sleeping sickness monkey; between the 7th and the 25th day on three clean monkeys, which remained healthy; from the 26th to the 30th day on a monkey which sickened of trypanosomiasis; and between the 31st and 48th days on three other monkeys which likewise sickened. The remaining 47 flies were parcelled out and fed on various monkeys, and it was at length determined that a single fly was infective. In the other positive experiment two infective flies were found; that is to say, 0·21 per cent. of the flies employed became infective. Of 400 flies of the negative experiments which were killed after 70 days ten, that is to say, 2·5 per cent. had developmental forms of trypanosomes in their gut. The former result, therefore, was confirmed that the development of *T. gambiense* in *Glossina morsitans* may begin, but in spite of sufficient time is frequently not completed. It is clear, the authors write, that climatic conditions exercise a favourable or unfavourable influence on the development of the parasite in the flies.

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* In a footnote the opinion is expressed that what Ziemann described as *T. vivax* was a mixed infection of *T. cazalboui* and *T. congolense*.

They suggest that sleeping sickness is found chiefly in *Glossina palpalis* regions because this species lives in specially damp and hot places, that is to say, those which are favourable to the development of *T. gambiense*. It appears that *G. palpalis* is able to transmit the parasite at places where *morsitans* is not able. This, however, is not certain. Unfortunately no parallel experiments were made with *Glossina palpalis* and it is possible that at the place where *Glossina morsitans* could not transmit infection *G. palpalis* might at the same season have behaved similarly. They consider it possible that in sleeping sickness regions *T. gambiense* is not able at all seasons to complete its development in *palpalis*.

For the present their standpoint is that in Africa under suitable climatic conditions every known species of trypanosome—as *T. brucei*, *T. gambiense*, *T. congolense*, *T. cazalboui*, *T. nanum*—can develop in every species of Glossina.

[This paper should be read together with that of KINGHORN and YORKE, summarised in this *Bulletin* (No. 3, p. 126). Their work renders it highly probable that temperature is the essential factor, and humidity negligible.]

A. G. B.

DRUG PROPHYLAXIS AND TREATMENT.

DUKE (H. L.). **Some Experiments with Arsenphenylglycin and** *Trypanosoma gambiense* **in** *Glossina palpalis*.—*Proc. Roy. Soc.* 1912. Dec. 17. Series B. Vol. 86. No. B 584. pp. 19-31.

The experiments detailed in this paper were devised to investigate the action of arsenic upon *Trypanosoma gambiense* as carried by *Glossina palpalis*. Four separate enquiries were made.

I. Does the presence of arsenic in the blood imbibed clean an infected fly of its flagellates?—Boxes of laboratory-bred *G. palpalis* known to be infective were placed upon monkeys which had previously received a subcutaneous dose of arsenophenylglycin, 0·1 gm. per kilo. body weight. The mortality after the arsenic feeds was heavy. The flies were dissected at varying intervals. Seven such experiments were made, the interval between the administration of the dose and the feeding of the fly varying between 24 and 72 hours. Fourteen positive flies were obtained and dissected, and an account of the findings in each is given. It is seen that the flagellates in the gut were often much modified, with the posterior end swollen, and that many or all were dead; sometimes none at all were seen in the gut. The forms in the salivary glands on the other hand were normal. It is noted that this difference had never been seen before in positive flies. The result of all the experiments is that the flagellates in the gut of flies fed upon a monkey within 24 to 48 hours of the administration of arsenophenylglycin in doses of 0·1 gm. per kilo. body weight are markedly affected. The flagellates in the salivary glands are apparently not injured in any way, nor does the fly lose its power to infect. The author remarks that this evidence supports the theory that the salivary gland flagellates are the normal infecting agents.

II. Has the preliminary feeding of flies on arsenic-containing blood any effect on the subsequent development of the flagellates in their interior?—Two experiments were made, one of which was positive. The flies were fed on an arsenophenylglycin-treated monkey and after a day's interval on a *gambiense*-infected monkey. Of these flies 2·6 per cent. were afterwards found infected with flagellates; of the flies fed first on a normal monkey (Control) 11·5 per cent. were found infected.

III. Does feeding on arsenic-containing blood, immediately after the infecting feed, prevent the subsequent development of flagellates in the fly, or does it result in the production of an arsenic-fast strain?—Two experiments were made. From them it appears that ingestion of such blood immediately after the infecting feed checks the subsequent development of the flagellates. The trypanosomes in a monkey which became infected showed no resistance to arsenic.

IV. Has arsenophenylglycin any prophylactic action against the bite of *G. palpalis* infected with *T. gambiense*?—Reference is made to a paper by **Mesnil** and **Kerandel** (summarised in *Sleeping Sickness Bulletin*, Vol. 3, p. 67), who tested the prophylactic action of the drug against inoculation of *T. gambiense* into monkeys. In one series of the present experiments 0·1 gm. per kilo. was inoculated subcutaneously; in the second series 0·05 gm. per kilo. It is noted that such doses applied to man mean a relatively enormous dose of arsenophenylglycin. Owing to the great sacrifice of experimental animals involved in testing the infectivity of each box reliance had sometimes to be placed on subsequent dissection of the flies to prove their infectivity. It is noted, as bearing on the experiments, that the mere introduction of the proboscis of a positive fly into the skin of its victim can produce infection (see *Sleeping Sickness Bulletin*, Vol. 4, p. 321), that a single positive fly can infect a clean monkey on three consecutive days, and that, as shown in (I), infectivity of the fly persists even after the gut has been cleared by arsenic feeding. The results are shown in two tables, one of which is reproduced.

It is concluded that the larger dose will protect a monkey against infection by positive *G. palpalis* if given twelve days before exposure (21 experiments) and that the small dose will protect if given within seven days (seven experiments). In **Mesnil** and **Kerandel**'s experiments with doses of 0·05 gm. per kilo. three days was the limit of protection.

Experiment No.	Period between administration of arsenic and application of the + flies.	Number of experiments fed on monkey.		Number of + flies to which monkey was exposed.		Duration of examination of monkey.	Result.
		First proved infective on a clean monkey.	Not so tested.	1st day.	2nd day.		
	Hours.					Days.	
418...	24-48	1	...	1	1	52	—
438...	24-48	1	...	4	4	Died after 9 days.	?*
452...	24-48	1	...	1	1	45	—
487...	24-48	1	...	2	2	40	—
493...	24-48	1	...	2	2	41	—
524...	48-72	1	...	2	2	11	?†
620...	48-72	1	...	1	1	50	—
632...	48-72	1	...	2	2	60	—
654...	72-96	1	...	1	1	60	—
694...	72-96	2	...	3	3	62	—
661...	96-120	1	...	6	6	50	—
662...	96-120	1	...	2	2	42	—
692...	96-120	1	...	2	2	62	—
695...	96-120	1	...	2	2	63	—
689...	120-144	2	...	5	5	67	—
708...	144-168	3	...	12	12	61	—
711...	168-192	2	1	5	5	54	—
718...	192-216	6	1	12	6	60	—
694 (*a*)	216-240	2	...	3	3	55	—
782...	264-288	...	3	3	3	49	—
757...	312-336	...	2	4	4	...	+

* Died of arsenic poisoning after second dose of drug.
† Showed severe local reaction ; killed.

The conclusions are as follows :—

"I. By feeding a *G. palpalis* which is infective with *T. gambiense* on an animal whose blood contains arsenic administered within 24 to 48 hours, the gut flagellates in the fly may be destroyed. Those of the salivary glands, however, which are the infecting forms, are unaffected. It is highly probable that the gut may become repopulated with flagellates from the salivary glands.

"II. Preliminary feeding of flies on arsenic-containing blood has a deterrent effect on the subsequent development of *T. gambiense* ingested within 24 to 48 hours after the arsenic blood.

"III. The feeding of flies on arsenic-containing blood immediately after the imbibition of *T. gambiense* usually prevents further devolopment of the trypanosomes in the fly. In the event of development occurring the strain produced is not arsenic-fast.

"IV. Arsenophenylglycin exerts a prophylactic effect in a monkey against infection with *T. gambiense* by positive *G. palpalis*; this effect varies with the dosage employed, and is considerably greater than when the trypanosomes are introduced by direct inoculation of infected blood."

A. G. B.

DANIELS (C. W.). **Cases of Trypanosomiasis in England, mainly at the London School of Tropical Medicine. (Second Report.)**—*Jl. London School of Trop. Med.* 1912. Dec. Vol. 2. Part 1. pp. 91-95.

The author refers to his previous paper, published in the same journal, summarised in *Sleeping Sickness Bulletin*, Vol. 4, p. 18.

Seventeen cases were there recorded, of which five had died and twelve were alive. Eleven of these are known to be still living. Details may be seen in the table.

Case.	Initials.	Probable date of onset of symptoms.	Trypanosomes found.	Latest reports as to signs of disease.	General Result.	Duration of disease in years.
			Treated with Liq. arsenicalis and other drugs.			
1	H. K. (Ford and Dutton's case).	—	—	—	Death Jan. 1903, Cerebral symptoms.	$1\frac{2}{3}$
2	Mrs. M. ...	1900–1901.	July 1902.	None	Good health ...	11–12
3	Mrs. S. ...	1901	Oct. 1902.	—	Death Nov. 1903, Sleeping Sickness.	$2\frac{1}{4}$
4	J. M. ...	June 1902.	March 1903.	—	Death 1906, Sleeping Sickness.	4
5	Mrs. G. ...	?	1902	None	Good health ...	10 or more.
			Treated with Atoxyl.			
6	Z.	—	July 1905.	None	Good health ...	over 7
7	Mrs. R. ...	June 1905.	Sept. 1905.	None	Fair health ...	$7\frac{1}{3}$
8	H. C. C. S.	1905?	Feb. 1906.	None	Good health ...	about 7
9	W. R. E. ...	Sept. 1906.	Jan. 1907.	—	Death March 1908, Pneumonia.	$1\frac{1}{2}$
10	E. G. ...	Dec. 1907.	Jan. 1908.	None	Good health ...	5 or more?
			Treated with Atoxyl and Antimony either by mouth or by injection.			
11	C. G. ...	Nov. 1906.	Jan. 1907.	None	Good health ...	6
12	C. V. ...	July 1909.	June 1910.	None	Good health ...	$3\frac{1}{4}$
13	A. P. ...	July 1907.	July 1907.	None	Good health ...	$5\frac{1}{4}$
14	D. H. L. ...	Aug. 1908.	Aug. 1909.	—	Death 1911, Septicaemia.	$2\frac{10}{12}$
15	Dr. McD....	Dec. 1909.	Dec. 1909.	None	Good health ...	$2\frac{3}{4}$
16	W. G. ...	Sept. 1909.	Oct. 1909.	Present	Fair health* ...	$3\frac{1}{12}$ still infected.
17	C. W. B. ...	July 1910.	June 1911.	None	Good health ...	$2\frac{1}{4}$
18	H. R. T. ...	March 1912.	July 29 1912.	—	Died suddenly Aug. 26, 1912.	$\frac{5}{12}$
19	A. C. E. ...	April 1912.	May 1912.	—	Died suddenly Sept. 30, 1912.	$\frac{5}{12}$

* Died after an epileptiform seizure, Dec. 15, 1912 (Ed.).

The author considers that seven may be considered as recoveries and that of the other four three are probably on the way to recovery. The remaining case, W. G. (a Rhodesian case), was described in some detail in the last paper. There has been little change in his condition; he still has attacks of pyrexia every eight to twelve days. Atoxyl is given regularly. The strain obtained from this patient is strain G of Wenyon (see below p. 276). The two fresh cases described are also from Rhodesia.

H. R. T. was employed 300 miles north of Bulawayo and had never been north of the Zambesi. *Glossina morsitans* was common in his district and he did a good deal of shooting. His illness commenced in March 1912 with fever; he was admitted to the Albert Dock Hospital on July 31st. The features of his illness were the absence of all rash, late appearance of enlarged glands, testicular swelling, and sudden death on August 26th without pronounced nervous symptoms. He received atoxyl intramuscularly and rectal injections of tartar emetic. The strain from this case is strain T of Wenyon.

The case of A. A. E. has been recorded by Stannus (see *Sleeping Sickness Bulletin,* Vol. 4, p. 266). The symptoms commenced about April 4th, 1912; the patient was admitted to the Albert Dock Hospital on August 1st. In this case again there was no definite erythema; the glandular enlargement was slight; there was transient testicular enlargement; splenic enlargement, muscular tenderness, and anaemia were very marked. The patient left the hospital and died suddenly on September 30th. The strain from this patient is strain E of Wenyon.

Commenting on these three cases, all due to the "variety (? species)" described as *T. rhodesiense,* the author says they are all of greater severity and more resistant to treatment than the cases seen from Uganda and West Africa. Orchitis was present in two of the three, whereas it occurred only in one of the other cases. Anaemia was very marked, as well as delayed muscular pain on trivial injuries. There were, however, no symptoms that have not been observed in patients from other parts of Africa. The trypanosomes in man were indistinguishable from *T. gambiense.*

The author discusses the position of the parasite and its relation to *T. gambiense.* With regard to the steady extension of trypanosomiasis south he thinks that expeditions have now done their work and that centripetal preventive measures must replace centrifugal observations of the spreading area of infection. An organised resident medical service will be required and one or more central laboratories.

A. G. B.

Johnson (J. T. C.). **A Proposed New Treatment for Human Trypanosomiasis.** [Correspondence.]—Lancet. 1912. Nov. 30. p. 1541.

Dr. Johnson calls attention to the fact that in 1895 Sir William Roberts read a paper on anarcotine, an alkaloid of opium, in the treatment of malaria. He regarded it as an antiperiodic of great power, analogous to, but not identical with quinine. The author suggests the use of this alkaloid in another protozoal disease, sleeping sickness. From his own experience he can say that it is not harmful. He suggests that the drug be given in the form of pill, one, two, or three grains two or three times a day.

A. G. B.

T. RHODESIENSE.

WENYON (C. M.) & HANSCHELL (H. M.). **Notes on** *Trypanosoma rhodesiense* **from Three Cases of Human Trypanosomiasis.**—*Jl. London School of Trop. Med.* 1912. Dec. Vol. 2. Part 1. pp. 34-35.

This paper treats of strains G, E, and T from the Rhodesian cases described above by DANIELS. The trypanosomes in man never showed the posterior arrangement of the nucleus; these forms appeared first in the blood of rats inoculated from man. It is noted that though the posterior displacement occurs most commonly in the broad trypanosomes it is seen also in a small percentage of the very narrowest forms with long free flagellum. The percentage of posterior nuclear forms varies very much: in the G strain from 0 to 0·9, in the E strain from 3 to 7, and in the T strain from 13 to 40. In each case the percentages are based on counts of 1,000 trypanosomes made every three days. In other rats in the series the percentage remained constant except in the case of the E strain. Occasionally the G strain showed no posterior nuclear forms; in such cases it would be difficult to separate the trypanosomes from *T. gambiense*. The idea that some connection might exist between the virulence of the strain and the percentage of posterior nuclear forms proved unfounded. It is suggested that if a strain when inoculated from man into the rat contains many posterior nuclear forms the strain is likely to prove very virulent for the individual from whom it is derived.

A. G. B.

BIONOMICS OF TSETSE FLIES, AND CLEARING MEASURES.

LLOYD (Ll.). **Notes on** *Glossina morsitans*, **Westw., in the Luangwa Valley, Northern Rhodesia.**—*Bull. Entom. Research.* 1912. Nov. Vol. 3. No. 3. pp. 233-239.

The author, the Entomologist to the Luangwa Sleeping Sickness Commission, examined a small portion of the Luangwa Valley between August 1911 and March 1912. The physical features and climate are described. From June to December the whole valley is very dry; the vegetation consists of mopani trees with little or no undergrowth. The seasonal variations of *Glossina morsitans* are described; the species decreases in the dry season and increases in the rains. Notes are given of the habits of the flies in the valley and on the plateau. The author finds it advisable to have the bottoms of the trousers closed as the flies often enter and bite above the socks. With regard to the swarms of tsetse flies which accompany a moving object it is pointed out that the swarm consists almost entirely of males, just as is the case with midges; in each instance they are on the watch for females. Native fowls were used to feed the captive flies. The blood was found to form large clots in the sucking stomach, which would persist for some weeks and prevented the retention of full-grown larvae. No evidence was obtained that the flies took any food other than blood. They did not bite Sphingid larvae when they had the opportunity. [ROUBAUD in West Africa found that *G. palpalis* would readily bite Sphingid larvae.] On one occasion the laboratory was raided by hordes of a red driver ant; these destroyed every fly, but did not hurt the pupae. A table is given showing the duration of the pupation period at various temperatures. Fifty-one days at 67° it gradually became less as the temperature increased till when this reached 85° it was twenty-three days. This is shown graphically in a diagram. The breeding of flies was much interfered with in the hot dry season, the number of pupae being reduced and a large number dying.

A. G. B.

NEAVE (S. A.). **Notes on the Blood-Sucking Insects of Eastern Tropical Africa.**—*Bull. Entom. Research.* 1912. Nov. Vol. 3. No. 3. pp. 275-323. With 2 plates.

In the course of his journey through Tropical East Africa, undertaken in 1910 and 1911, the author visited Nyasaland, British East Africa, Uganda, and portions of Northern Rhodesia and German East Africa. About 15,000 blood-sucking arthropods were collected. The following families are considered—Chironomidae, Culicidae, Simuliidae, Psychodidae, Tabanidae, Muscidae, and Hippoboscidae. The tsetse flies are dealt with on pages 299-309. Seven species are known from these regions.

Glossina morsitans.—An account is given of the answers to a series of questions on the habits of this species, issued by the Entomological Research Committee. Neave believes that among the essential factors which determine its distribution are a combination of the presence of such vegetation as will provide moderate but not excessive cover, and a hot and moderately or even very dry climate. He has often noted that when the grass is long (not less than four feet) *Glossina morsitans* is inclined to be more numerous in grassy areas of limited size than in the woodland or bush country surrounding them; he has seen this species swarming in long grass from half to one mile or more from the line of bush at the edge. Its complete independence of water is remarkable; the dryer the atmosphere the greater seems to be its activity. He considers that the presence or absence of big game is not the primary factor in determining the fly's distribution. He discusses the reason for the extension which is believed to have taken place in Northern Rhodesia and Nyasaland and expresses the opinion that the flies are recovering the ground lost at the time of the rinderpest. As to what caused this loss of ground he is uncertain, but it was not extermination of game because several species were little or not affected by the rinderpest. He thinks that *G. morsitans* can only be exterminated by extensive cultivation of the area it occupies. This must, however, be kept cultivated as it seems probable that not only *G. morsitans* but *G. pallidipes* will return to land where the bush has been allowed to grow up again.

G. pallidipes.—This somewhat resembles *G. morsitans* in its habits, but appears not to be so completely independent of water. It occurs mainly in the coast belt near the Equator.

G. austeni, Newst.—Neave caught this species in two localities in British East Africa. It is easily recognised by the bright rufous colour of the upper part of the abdomen. It is found in company with *G. pallidipes* and *G. brevipalpis* and would appear to be confined to the coast belt in British East Africa. It has not been captured higher than 1,500 feet above sea level.

The other species discussed are *G. palpalis, G. brevipalpis, G. longipennis,* and *G. fusca.* The notes are summarised in the following classification according to environment.—

"A. Requiring a great degree of atmospheric humidity:—
  "A. 1. Requiring a high temperature. *G. palpalis,* R. D.
  "A. 2. Not requiring a high temperature. *G. fusca,* Walk.
"B. Requiring only a moderate degree of humidity:—
  "B. 1. Requiring comparatively little cover. *G. pallidipes,* Aust.
  "B. 2. Requiring fairly heavy timber and bush. *G. brevipalpis,* Newst.
  "B. 3 Requiring more or less dense forest. *G. austeni,* Newst.
"C. Independent of water and most active in a dry atmosphere. *G. morsitans,* Westw., and *G. longipennis,* Corti.

"The three large species, *G. brevipalpis, G. longipennis* and *G. fusca,* may also be separated from the others by their being mainly crepuscular or nocturnal in their habits, instead of being most active in sunshine."

At the end of the paper lists are given of blood-sucking arthropods arranged according to locality. In a note it is suggested that the *G. tachinoides* recorded from German East Africa may prove to be *G. austeni,* Newst. The paper contains two plates, illustrating twenty *Tabanidae.*

A. G. B.

Fell (T. E.). **Notes on Tsetse-Flies and on Prophylactic Measures against Sleeping Sickness in the Western Province of Ashanti.**—*Bull. Entom. Research.* 1912. Nov. Vol. 3. No. 3. pp. 227-231.

Mr. Fell, Provisional Commissioner, Ashanti, gives data of the habitat of the tsetse flies in this district, namely, *G. fusca, G. palpalis, G. pallicera,* and *G. longipalpis.* The common species are *palpalis* and *longipalpis.* Tsetse-flies practically disappear from December to the end of March and reappear when the rains are thoroughly established. An effective clearing was made at Sunyani and is maintained by the constant labour of thirty to fifty men a day, but odd flies still appear in the European quarters. The author has convinced himself that a forest clearing not effectively maintained produces a scrub growth which is more favourable to tsetse flies than the forest itself. Thus a position of affairs may be produced which is more dangerous to the population than that which has hitherto existed. He doubts whether the small populations of the villages can effectively maintain the clearings which are at present advocated. As to clearings round village water supplies he points out that the removal of shade may diminish the water, if not dry it up altogether, causing a water famine. He does not think that roads at river crossings can be effectively cleared unless by Government labour at great expense, which in his opinion is at present unwarranted. Moreover, in the present state of sleeping sickness in Ashanti the object of enforcing clearings would not be understood by the natives and compulsion would tend to make them conceal cases. He points out that where the disease is most prevalent *longipalpis* exists together with *palpalis;* he suggests that that species may be a transmitter. In conclusion he urges—

"1. That the native should be encouraged to report cases of sleeping sickness for diagnosis and treatment, and to give evidence, and should not be frightened by excessive compulsory work into concealment of the disease.

"2. That the population is not sufficiently large to maintain extensive effective clearings.

"3. That a non-effective clearing of forest produces a condition probably more dangerous than no clearing at all.

"4. That clearing round water supplies should only be undertaken with the greatest caution.

"5. That clearings at river crossings in forest are impracticable unless undertaken with Government-paid labour, and that the cost of clearing and maintenance is not at present warranted, owing to the limited occurrence of sleeping sickness"

At present he would advocate object lessons of extensive clearings round European stations and the upkeep of village clearings of such an extent as can be effectively maintained by the population, the extent to be left to the discretion of the administrative officers. Finally, he gives notes about the wild mammals of this district.

A. G. B.

TRYPANOSOMIASIS IN NYASALAND AND BELGIAN CONGO.

In Part 18 of the *Nyasaland Sleeping Sickness Diary,* dated September 30th, 1912, by H. **HEARSEY**, P.M.O., seventeen additional cases of sleeping sickness in natives, diagnosed by Dr. **SHIRCORE**, are described. These with the 76 previously recorded make a total of 93. Five of the patients died shortly after trypanosomes were detected; details are given of twelve, ten men and two women. In eleven of these tremors of the hands, and more rarely of the tongue, are noted. In ten there was oedema of some part of the body. In most the gait is described as shuffling. The glands of the posterior triangle are described as small, not puncturable, not palpable, or at most a small chain, in eleven of the cases; in the twelfth they were enlarged and puncturable. In many the epitrochlears seem to have been enlarged. In two cases, in adult males, interstitial keratitis is recorded.

It is noted that the medical officers investigating in the districts adjacent to the sleeping sickness area had not up to the present found any cases; this failure may be attributable to concealment of the sick. Some notes are given of the use of a dye in treatment.

[Interstitial keratitis, common enough in trypanosome infection of animals, has been recorded only once before as a symptom of human trypanosomiasis, by **THIROUX** and d'**ANFREVILLE** in 1911.*]

A. G. B.

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* *La Maladie du Sommeil et les Trypanosomiases animales au Sénégal.* A. **THIROUX** & L. d'**ANFREVILLE**. 1911. Paris : Librairie J.-B. Baillière et Fils. p. 23.

In the Report on the Administration of the Belgian Congo for the year 1911, under the heading Medical Service, it is stated that there are 27 lazarets for sleeping sickness patients. These establishments are intended chiefly for natives in the last stage of the disease; others stay only till the diagnosis is confirmed. The number of patients treated in lazarets for the financial year 1911-12 was about 4,000. Ambulatory medical treatment is very generally employed, by doctors who travel in the neighbourhood of their stations. An enormous number of patients have been thus treated; at Beni, for instance, 1,000 patients per week. It is noted that this form of treatment can be undertaken by laymen. There were 34 clearing brigades with an effective strength of 1,700 men. Owing to the wide distribution of *G. palpalis* removal of villages has been practicable in hilly districts only. As a rule small villages are collected into larger, which are better able to keep up proper clearings. It is noted that the disease has been particularly severe in the basins of the Semliki, of Lake Kivu, of the Kwilu, and of the Kwango rivers. The sum of 155,000 fr., obtained by the sale of flowers and put at the disposal of the Administration by the Queen, will go to the erection at Leopoldville of a model lazaret, the training of 20 hospital assistants, and the purchase of instruments and medicines for the combating of sleeping sickness; these will be entrusted to missionaries trained to use them.

A. G. B.

UNCLASSED.

LAFONT (A.). **Trypanosomide d'un Réduvide** (*Conorhinus rubrofasciatus*) **Inoculable au Rat et à la Souris.**—*Ann. Inst. Pasteur.* 1912. Nov. 25. Vol. 26. No. 11. pp. 893-922. With 2 plates.

Conorhinus rubrofasciatus is a Reduviid bug known in Mauritius as "*Punaise maupin.*" Specimens from Réunion were also studied. The biology of the Hemipteron is set forth in detail in the latter portion of the paper. The insect is a blood sucker, which will attack man.

The flagellates commonly occurring in the digestive tract of the bug are described. They are found chiefly in the intestine, rarely in the stomach, and never in the salivary glands, Malpighian tubules, ovaries and haemocoel. The flagellates were studied in life and in stained preparations.

The author describes in detail (1) various crithidial forms (short, medium and long); (2) small trypanosome forms, with large blepharoplast; (3) rounded forms, some of them like *Leishmania*; (4) cystic forms, elongate or fusiform; (5) dividing and abnormal forms. The morphology of all these is set forth in detail with figures.

Attempts at culture were not very successful, the parasites being merely conserved for a few days.

The author tried to transmit the flagellates of the *Conorhinus* intestine to mammals. Attempts by insect bites on *Macacus cynomolgus* and guinea-pigs failed. Subcutaneous inoculation of intestinal contents of the insects in Macacus, rats, guinea-pigs, rabbits, etc., also failed. Intraperitoneal inoculation of intestinal contents suceeded only in the case of rats and mice. Living flagellates were seen in the peritoneal fluid of the inoculated rats up to 30 hours, encystment and phagocytosis occurring. These rats were free from *T. lewisi*, but all died from various undetermined causes. In inoculated mice of Mauritius the trypanosome seen in the blood was three to four times the size of the small trypanosomes seen in the Reduviid intestine. In inoculated mice of Cilaos the trypanosome was smaller than in Mauritius mice. In the mouse the trypanosome has a blepharoplast which is near the nucleus, therein differing from *T. lewisi* and *T. duttoni*. Dr. Lafont also shows that the parasite is not *T. evansi*.

The author discusses his results more particularly from the point of view of whether the Reduviid harbours a trypanosome of another animal. The flagellate in the insect is polymorphic. Intermediate forms leading to the larger trypanosome were seen. The name *T. boylei* has been given to the trypanosome phase in the rodent's blood, with its developmental phases in *Conorhinus*.

Perhaps *T. boylei* may be pathogenic to man, and transmitted by *Conorhinus rubrofasciatus*. The author hopes that his data will lead some worker, more fortunate than himself, to discover a new human trypanosomiasis.

[In the space available it is, unfortunately, not possible to give a detailed summary of this interesting and well-illustrated memoir. Those interested should consult it in the original.]

H. B. F.

GONDER (Richard). **Experimentelle Studien mit Trypanosomen und Spironemen (Spirochäten).** [Experimental Studies on Trypanosomes and Spirochaetes.]—*Zeitschr. f. Immunitätsforschung u. Exper. Therapie.* 1912. Nov. 2. Vol. 15. Nos. 2 & 3. pp. 257-291. With 1 plate.

The author's summary of this paper, which is divided into four parts, is to this effect—

(1) Diminution of avidity, in EHRLICH's sense, can be made visible to the eye. Normal trypanosomes stain with certain orthochinoid substances during life; arsenic-fast trypanosomes, on the other hand, stain only after death.

(2) Certain orthochinoid substances cause the blepharoplasts of many trypanosomes to disappear. The chemical attacks the blepharoplast directly; in the case of *Trypanosoma lewisi* this endeavours to reach the macronucleus. Oxidation (LAVERAN and ROUDSKY) seems not to take place. (3) Trypoflavin, arsenophenylglycin, and salvarsan become fixed *in vitro* in the body of the trypanosome, as is shown by animal experiments. Trypanosomes treated *in vitro* with these drugs are not capable of infecting mice. (4) The serum of animals injected intravenously with salvarsan is, a short time after, even *in vitro,* active on *S. recurrentis* and *S. gallinarum,* and also acts therapeutically.

(1) The conclusion is supported by a series of tables. These show that between normal and arsenic-fast nagana strains there is a great difference. Normal trypanosomes placed in contact with oxazine solution stain during life very quickly and then soon die; arsenic-fast trypanosomes do not stain in life and remain alive for a much longer time in the oxazine solution. Whereas a dilution of 1:150,000 oxazine kills the normal trypanosomes in six hours and can stain them after half an hour, the same concentration is entirely without influence on arsenic-fast trypanosomes, even though it acts for a much longer time.

(2) The conclusion drawn from the observations is that a series of orthochinoid substances such as pyronin, oxazine, and trypoflavin, produces a morphological change in the trypanosomes, *viz.* a disappearance of the blepharoplast. In the case of *T. brucei* the destruction of the blepharoplast takes place on the spot owing to the fact that these trypanosomes or their blepharoplasts have a great avidity towards the dye. Other trypanosomes, such as *T. lewisi*, are much more resistant. In the case of *Trypanosoma lewisi* the blepharoplast seeks to reach the macronucleus, but succumbs on the way.

(3) Here again the conclusions are supported by the tables.

A coloured plate shows the action of various substances on the blepharoplasts of trypanosomes.

A. G. B.

Bettencourt (A.) & Borges (I.). **Présence de Trypanosomes dans le Sang des Bovidés portugais.**—*Bull. Soc. Path. Exot.* 1912. Nov. Vol. 5. No. 9. p. 725.

Reference is made to a previous paper (see this *Bulletin*, No. 3, p. 139). Between June and September 62 cattle were examined. Cultural flagellates were found in 25, all from cattle from Portugal. 23 cattle from the Azores gave no flagellates. The authors suggest that this might be due to the absence of the invertebrate transmitter from the Azores.

A. G. B.

Brumpt (E.). **Pénétration du** *Schizotrypanum Cruzi* **à travers la Muqueuse Oculaire Saine.**—*Bull. Soc. Path. Exot.* 1912. Nov. Vol. 5. No. 9. pp. 723-724.

The author states that *Cercopithecus ruber* is the monkey which is most susceptible to infection by *Schizotrypanum cruzi*, just as it is to infection by *T. gambiense.* One of these monkeys was bitten by *Conorhinus megistus*, the dejecta of which were infective, another by *Cimex lectularius* also with infective dejecta; neither became infected. The author is uncertain whether one should conclude that Conorhinus never transmits the disease by biting or whether it is a question of accidental localisation of the parasite in the salivary glands. *S. cruzi* has a great power of penetration since it can make its way into almost all the cells of the body. The author therefore experimented to see whether the dejecta of Conorhinus can infect by penetrating the healthy skin or mucous membrane. Experiments in which dejecta were placed on the skin of monkeys and rats were negative. On the other hand, dejecta placed on the ocular globe of an adult *Cercopithecus ruber* infected it, and the animal died as quickly as it would have done had it been inoculated in the peritoneum. In the course of an autopsy on a highly infected rat Brumpt got some virulent blood in his eye; some drops of silver nitrate solution were instilled a few minutes later and, he believes, prevented infection.

A. G. B.

ANNUAL REPORTS FROM BRITISH AFRICAN COLONIES.

COLONY OF THE GAMBIA. **Annual Report of the Medical Department for the Year 1911.** [CHARTRES (E. A.), Senior Medical Officer.]—38 pp. 1912. Printed by Waterlow & Sons, Ltd., London.

Smallpox.—A small outbreak of smallpox occurred during the months of January and April. The infection was traced to labourers who came from French territory. Twelve cases were admitted; none proved fatal. 2,491 successful vaccinations were done in Bathurst and 394 in the Protectorate. The lymph used was supplied from the Incorporated Liverpool Institute of Comparative Pathology and the results continued to be as good as in former years.

Yellow fever.—There were three outbreaks of this disease in May, July and November—four cases occurred in May, with three deaths; six in July, with five deaths; and one fatal case in November. For prevention the ordinary anti-mosquito methods were adopted. Ships were anchored 1,000 yards from the shore, and no direct communication was allowed; all cutters and boats going alongside were examined for mosquitoes and fumigated; labourers and others employed were examined by a Medical Officer, and no cargo or passengers were taken on board. The disease now seems to have died out. [A fuller account appears on p. 250.]

G. C. LOW.

SIERRA LEONE. **Annual Report on the Medical Department for the Year ended 31st December, 1911.** [FORDE (R. M.), Principal Medical Officer.]—80 pp. 68 illustrations and 3 charts. 1912. Printed by Waterlow & Sons, Ltd., London.

The general health of the European officials was satisfactory; they numbered 192 during the year (an increase of 21 over the previous year). There was no death from disease. The following climatic diseases were noted amongst them: blackwater fever 1 case; dysentery 1; malaria 27; syriasis 1; liver abscess 1; liver congestion 4.

As regards the general population the following diseases are specially noted.—

Small pox.—There was no epidemic outbreak of this disease during the year. Only 5 cases were reported. 8,432 vaccinations were carried out with 5,199 successes.

Yellow fever.—No case of this disease was met with during 1911.

Dysentery.—197 cases of dysentery [variety not stated] were reported.

Malaria.—2,208 cases were treated during the year, *i.e.*, 264 less than in 1910 for the Colony and Protectorate and 151 fewer cases for Freetown. This points to the efficiency of the mosquito eradication which is now being carried on in Freetown.

Yaws.—This disease does not seem to be progressive in Sierra Leone, much fewer cases (66) having been treated in 1911 than in the previous year.

Beriberi.—A lessened consumption of imported rice has reduced the number of cases of this disease as compared with 1910. Only 8 cases were met with.

Leprosy.—The disease does not seem to be on the increase. Exclusive of cases in the male leprosy segregation ward at Kissy, only 10 were reported.

Trypanosomiasis.—No cases reported.

Ankylostomiasis.—The parasite is common but treatment for conditions resulting from infection is not very frequently sought. During 1911 only 8 cases were treated.

Filariasis.—See this *Bulletin*, No. 2, p. 92.

Quarantine.—During the year it was not found necessary to open the Sanitary Station for the isolation of passengers and crew arriving at the port of Freetown from infected places. The old lazaretto at Kissy, chiefly used for the segregation of smallpox contacts arriving from infected ships or ports, was opened once for the isolation and observation of 45 natives (passengers and crew) who were landed from a steamer on which a case of smallpox was said to have occurred. The case, however, turned out to be one of chicken pox.

An excellent series of photographs illustrates the sanitary part of the report. They show very clearly the difficulties the Sanitary Officer has to contend with in these parts.

G. C. L.

GOVERNMENT OF THE GOLD COAST. **Medical and Sanitary Report for the Year 1911.** [TWEEDY (E. H.), Acting Principal Medical Officer, & RICE (T. E.), Senior Sanitary Officer.]—208 pp. 9 diagrams and charts. 1912. London: Waterlow & Sons, Ltd., Printers.

Small-pox.—This disease was very common during the year in the Eastern Province and although every means was taken to stamp it out by vaccination and isolation the infection was kept alive by the natives adopting the direct inoculation method. Slight outbreaks also occurred in the Central and Western Provinces of the Colony but were easily dealt with. 18,895 successful vaccinations were performed during the year. As regards Ashanti an epidemic started in 1910 and continued for about four months in 1911 when it was stamped out.

Sleeping Sickness.—Cases of this disease were prevalent in the North Western Province of Ashanti, seventeen deaths having been reported. In other parts of Ashanti twelve cases were under treatment with atoxyl, and at the end of a course extending over a period of five or six months the parasites disappeared from the blood and the patients were able to resume their ordinary work.

Blackwater Fever.—Eight patients suffering from blackwater fever were admitted into hospital during the year; four died. Three cases occurred at Accra, two at Seccondee, two at Axim and one at Tamale. The history of all showed great exposure to infection or carelessness in the mode of living, quinine being taken irregularly or not at all; and in one case a mosquito net was seldom used. Six other cases occurred in Ashanti, three amongst the mining community and three in Syrian petty traders; of this number two ended fatally.

Yellow Fever.—During the year nine cases occurred; seven during May and June, one in February and one in December. It is difficult to account for these latter two. Their occurrence suggests a latent infection, and such isolated outbreaks will only be prevented from becoming general by vigorous action on the part of the Sanitary Staff.

The following measures were taken to prevent the spread of infection at Accra:—

"1. All contacts were isolated and kept under observation for a period of six days.

2. All the non-immunes in the neighbourhood were kept under observation and the temperature of each was taken twice daily.

3. Great care was taken to enquire into all deaths and cases of rise of temperature amongst the natives.

4. The infected house and all buildings in the vicinity were sealed and fumigated with sulphur gas, either by the Clayton machine or by burning the sulphur in open basins. A number of Alformant lamps were distributed amongst the non-immunes living in the native town.

Since no other case occurred, the measures may be stated to have been successful."

The isolated case which occurred on the 21st December, 1911, lived on Railway Hill. After this all the Europeans were removed from that area and kept under observation. All the buildings on the hill were fumigated. No further cases occurred.

In addition to these local measures general works were undertaken to prevent the disease, these including the destruction of mosquitoes and the introduction of pipe-borne water into the different towns.

Plague.—No case of plague was reported during the year. A general campaign has been carried on, however, against rats. All of those examined gave negative results.

G. C. L.

SOUTHERN NIGERIA. **Annual Report on the Medical Department for the Year 1911.** [HOOD (T.), Acting Principal Medical Officer.]—63 + xcv. pp. 1912. Printed by the Government Printer, Lagos.

Except at Lagos and Ebute Metta, vital statistics are unreliable and it is only possible to state that the public health in the Colony and Protectorate has been fairly good during 1911.

In Lagos the incidence of infant mortality is high and deaths connected with pregnancy are of frequent occurrence. The establishment of a Lying-in Hospital is under consideration, in which case it is hoped that principles of infant hygiene will be taught and that midwives will be suitably trained.

Malaria is widespread throughout the whole of Southern Nigeria and it is estimated that quite ninety per cent. of the cases are of the aestivo-autumnal variety.

Blackwater Fever.—26 cases were reported during 1911. There were seventeen recoveries and nine deaths. Eleven officials contracted the disease and seven recovered. Five cases occurred amongst the subordinate European staff of the railway.

Trypanosomiasis.—The disease is probably endemic in the Niger Delta; only five cases however came under observation during the year and two of these were certainly imported from Fernando Po. As soon as cases are discovered they are segregated in fly-proof rooms.

Yellow Fever has not been observed during the year. A case of fever which occurred in a native at Forcados suggested a mild type of this disease; the patient recovered and no other case occurred.

Beriberi.—From time to time patients suffering from beriberi are seen in Lagos. The majority are Kroomen and not natives of the Colony. Kroomen are for the most part engaged on ships or by the merchants as coopers and labourers, and receive rations of rice. They are not accustomed to living on yams, the staple food of the natives of Southern Nigeria. The disease in their case probably results from the consumption of inferior imported rice.

Epidemic Dropsy.—Towards the end of the year a disease, resembling the description given of epidemic dropsy, broke out in the Abeokuta Prison. There were 25 cases and 9 deaths. Whether this outbreak was a form of beriberi or not it is difficult to say, but in none of the patients was there any marked irregularity of the heart, or loss of knee jerks or hyperaesthesia of the calf muscles; and oedema of the legs was a late symptom. The exciting causes were probably overcrowding and unsuitable food, as immediate improvement took place on removing the patients to the sea shore and providing them with a generous meat and fish diet. Prisoners receive a rice ration three times a week, but preparations of yams form the bulk of their diet.

Small-pox.—There was no great epidemic of small-pox in Southern Nigeria. The disease manifested itself mostly at Ibadan and in the neighbourhood of Northern Nigeria. The total number of persons vaccinated during the year was 166,394, being an increase of 30,747 over 1910. Chicken-pox was epidemic at Warri, Onitsha, Calabar, and Ikot-Ekpene.

Ankylostomiasis.—The number of people infected by ankylostomes is extremely high—probably about 75 per cent.—but fortunately the infection seldom gives rise to serious symptoms. Most of the serious cases occurred amongst prisoners, probably because prison life lowers the system.

Dracontiasis.—Patients infected with guinea worm are fairly common in Southern Nigeria. The disease is most prevalent in the Western Province.

Schistosomiasis.—*Schistosomum haematobium* appears to be endemic in the Western Province.

Filariasis.—See this *Bulletin*, No. 2, p. 92.

G. C. L.

NORTHERN NIGERIA. **Annual Medical and Sanitary Report for the Year ending 31st December, 1911.** [MANNING (F.), Acting Principal Medical Officer, & BLAIR (M. Cameron), Senior Sanitary Officer.]—50 pp. 1912. London: Waterlow & Sons, Ltd., Printers.

The average European population during the year was 641, viz., 616 males and 25 females or 368 official and 272 non-official, besides 79 Lagos railway officials resident in Northern Nigeria. As there is now a large mining community with its own medical men, who have not been in the habit of making any returns except in the event of deaths which have to be officially dealt with by the political officers, accurate statistics are difficult to obtain.

Forty European officials were invalided during the year, in twenty-eight instances owing, directly or indirectly, to the effects of climate. Two officials were sent home to undergo the Pasteur treatment, having been bitten by a dog suspected of rabies.

In the sanitary part of the report the tropical diseases which occur in the Protectorate are discussed in detail.

Malaria.—During the year 1,636 cases, not necessarily 1,636 separate persons, were treated for malarial fever—207 Europeans and 1,429 natives, 11 of the latter dying. The figures probably include no native children and very few women; they chiefly refer to adult male employees, African, non-natives, soldiers, police, etc.

At all out-stations where medical officers are posted, regular consignments of kerosene are received for oiling purposes, and grants are given for clearing purposes to out-stations having no prison labour. Clearing of water courses is being carried out at stations as far as is possible with the supply of labour available, and this is well done at the three head-quarter stations in addition to Kano, Zaria, and Minna. Rain water tanks are protected by gauze, and where the gauze is defective are oiled as well. The use of the mosquito net is universal among those Europeans who have not secured mosquito-proof rooms, and is extending among the natives. Most Europeans take a daily five grain dose of quinine.

Blackwater fever.—This disease accounted for the death of six Europeans within the Protectorate.

Trypanosomiasis.—During the year 27 cases of trypanosomiasis were recognised; two of them ended fatally.

The clearing of bush likely to afford cover for tsetse flies is systematically carried out at all stations, and certain high roads are widened where they traverse fly-belts. As sleeping sickness was alleged to be in existence at Jigindi, a town in the Province of Nassarawa, Dr. PARSONS, the medical officer at Keffi, went to investigate. The history of several cases which had ended fatally was very suggestive of the disease, but the parasite could not be observed in the blood of any of the persons examined. Dr. Parsons, however, persuaded the people to move to a new town in a fly-free area.

Yellow fever is unknown in the Protectorate. *Stegomyia calopus* however is not uncommon along the courses of the great rivers;

e.g., it constituted 22 per cent. of the mosquitoes caught at Lokoja during the year; but it is not plentiful at the northern and inland stations, where it is seldom observed during the dry season. All passenger steamers are regularly inspected at Lokoja and at Baro; and this inspection, together with the putting of Burutu Beach entirely under the sanitary authorities of Southern Nigeria, constitutes the first line of defence against invasion by the disease.

Smallpox.—Of 80 cases treated 14 died, all natives. Endemic smallpox, which assumes an epidemic form annually, is very prevalent throughout the Protectorate, but at present it is impossible to compile accurate statistics of it. It generally begins to show itself in the second half of the dry season and, as a rule, dies down when the rainy season has seriously set in.

During the year 5,494 vaccinations were performed, and 3,879 proved successful. The fair number of successes recorded in the dry hot interior of the country continues to demonstrate the efficacy of powdered lymph. Constant efforts are directed towards the breaking down of the prejudice against vaccination which is harboured by many natives.

Dysentery.—During the year 26 European and 603 native cases were treated; 37 of the latter proved fatal [variety of disease not stated]. All possible steps are taken to induce the natives to safeguard their water-supplies by applying parapets to the mouths of their wells, by digging new wells in suitable places, and by closing wells which are known to be badly contaminated.

Leprosy.—84 cases were treated. The number of lepers is very large, but cannot be accurately determined.

Schistosomiasis.—6 cases of *S. haematobium* were treated.

Dracontiasis.—82 cases appear in the returns. The disease is common, possibly as common as dysentery in many places.

Filariasis.—See this *Bulletin* No. 2, p. 91.

General measures, such as sewage disposal, disposal of refuse, water supplies, drainage and clearance of bush, undergrowth, etc., are also dealt with in this interesting report.

G. C. L.

UGANDA. **Extracts from the Annual Medical Report for the Year ended 31st December, 1911, by the Principal Medical Officer, Uganda Protectorate.** [HODGES (A. D. P.)]—Unpublished Report to the Secretary of State for the Colonies.

Malaria was generally reported to have been more prevalent during the latter part of, and immediately after, the rainy seasons, that is, from May to July and from November to mid-January. The general type was mild and there was no exceptional increase or decrease in prevalence during the year. The percentage of natives treated was slightly higher and that of Europeans slightly lower than in the previous year. The great majority of the cases were aestivo-autumnal or tropical malaria, which continues to be the most important cause of sickness among Europeans and Asiatics in Uganda. The total number of cases treated was 5,286, including 203 Europeans. The total in 1910 was 4,078, including 225 Europeans.

Blackwater fever.—So far as seasonal prevalence is shown, it corresponds with that for malaria. The number of cases was considerably less, with a less mortality than in 1910, 18 cases with 3 deaths occurring as compared with 26 cases and 6 deaths.

Dengue was less prevalent, 69 cases being reported of which only one was admitted to hospital.

Yellow fever is as yet unknown in Uganda, though the carrier is common.

Elephantiasis.—Thirteen cases were reported as compared with eleven the previous year. Only one was admitted to hospital. This disease is more prevalent in the Eastern and Northern Provinces than elsewhere, and in certain localities is believed to be fairly common, but it seldom comes under medical observation.

Trypanosomiasis.—See this *Bulletin* No. 3. p. 135.

Relapsing or *spirillum fever* showed no sign of seasonal variation. It was much less prevalent among Europeans than among natives. The carrier, *Ornithodorus moubata,* is not yet known to exist in the Northern (Nile) Province and is comparatively rare in the Eastern (Busoga) Province, where it is of recent introduction, but in the rest of the Protectorate it infests native dwellings and traffic routes.

Dysentery was less prevalent than in 1910, and no serious epidemic was reported. The disease is more frequent in the Western Province (Ankole and Toro) than elsewhere, and is, on the whole, more common in the dry season.

Leprosy is not common, though it occurs throughout the greater part of the Protectorate. Hitherto Medical Officers have not come in contact with it much, but cases are likely to increase in the future as hospitals and dispensary accommodation is extended, and the confidence of the natives increases. Twenty-two cases were returned in 1911, sixteen in 1910 and eight in 1909; twelve of the twenty-two were of the nodular and ten of the anaesthetic type.

Undulant fever.—Twenty cases were returned. The disease is endemic in the Western Province and the extreme south of Buganda. In the former district it has been confused, under the name *muhinyo,* with sleeping sickness and other diseases, including probably beriberi. Large numbers of deaths are attributed to *muhinyo* in the native returns.

Plague.—" The return of cases which came under treatment is 34 with 29 deaths. There were 17 with 13 deaths in 1910, and 74 with 37 deaths in 1909. All the cases were admitted at Mbale (Bukedi) except one case, which was admitted at Jinja and which was infected at, or en route from Mbale. The deaths reported in native returns from the Bukedi districts for the last three years are as under:—

1909	682	deaths
1910	1,659	,,
1911	1,773	,,

Although these returns cannot be regarded as complete, they are improving in accuracy," and they tend to show that plague is on the increase in that district. "The greatest prevalence, as shown by native returns, was during the period from June to September and the least from October to December. All forms of the disease were seen, namely, bubonic, pneumonic, septicaemic and pestis minor. The type was, on the whole, severe and the mortality high. As has been previously reported, plague is widely endemic in the Protectorate, and minor epidemics, which are seldom heard of, occur from time to time among the natives of various parts. It has long been known to be endemic in the south-eastern part of Buganda, bordering on German East Africa, but no serious epidemic has occurred there during recent years." From time to time natives have reported large numbers of deaths in Busoga and other parts of the country but on investigation these have not been found to be due to plague. All rapidly fatal illnesses are generally attributed to that disease by the natives.

In the part of the report dealing with sanitation it is stated that the chiefs and others have been instructed to report all cases and all deaths from plague as they occur. Native inspectors are employed to see that this instruction is carried out and also instructions with regard to isolation of infected persons and contacts and the burning or disinfection of clothing and huts.

A temporary plague hospital with an isolation ward for contacts exists at Mbale, the chief station in the endemic area. The chiefs are encouraged to build segregation huts in the villages where the disease is endemic, and to place the sick in these as they are known. The Medical Officer reports that this is being largely done. Huts in which plague has occurred were burnt when possible and the rats destroyed. Compensation was given for huts and clothes which were burnt.

Haffkine's serum was used during the year and 197 persons vaccinated.

Plague has not yet occurred among the Asiatics, who number about 200 in Bukedi. This may be partly due to the fact that they all keep cats.

General measures are also given for sewage disposal, the disposal of refuse, clearance of bush and undergrowth, etc. A circular concerning leprosy has been issued to Medical Officers during the year and recommendations for future work are given in detail.

G. C. L.

NYASALAND PROTECTORATE. **Annual Report on the Medical Department for the Year ended 31st March, 1912.** [HEARSEY (H.), Principal Medical Officer.]—56 pp. Zomba: Printed by the Government Printer.

Malaria.—The seasonal incidence of malaria corresponded with that of previous years, the largest proportion of cases occurring during and shortly after the wet season. It should be remembered, however, that Europeans may become infected whilst travelling and this circumstance needs to be borne in mind when considering the seasonal distribution of cases among this community. There were 808 cases of malaria treated in 1911-1912, as compared with 786 in the year preceding.

Blackwater Fever.—Five cases of blackwater fever, as against three in the previous year, came under the care of the Medical Officers, this number including one Asiatic. Two of these cases had a fatal termination, namely, one European and the Asiatic referred to. It is noteworthy that notwithstanding the appreciable increase in the European population within recent years, the number of cases of blackwater fever has perceptibly diminished. This no doubt is mainly to be attributed to the greater attention which is now devoted to personal prophylaxis as regards malaria.

Tick Fever.—This disease is prevalent in the districts bordering the Lake but rarely comes under the notice of the Medical Staff.

Filariasis.—A few cases of elephantiasis occurred, mostly in the Lower Shire and North Nyasa districts. The scrotum would appear to be involved almost as frequently as the lower extremities.

Smallpox.—Seventy-eight cases of this disease, with fifteen deaths, were recorded during the year, as compared with 236 in the previous year. Notwithstanding that these cases were reported from six widely separated localities, in consequence of the promptness of the preventive measures adopted there was no spread of the infection to neighbouring villages. In two of the areas the infection was clearly demonstrated to have been introduced by natives entering the Protectorate from adjacent territories, and this is a danger which needs to be constantly guarded against.

Dysentery.—There were 317 cases of dysentery, with five deaths. The disease reaches its maximum incidence at the beginning of the wet season, owing to the scarcity, and presumably the pollution, of the then existing water supplies.

Beriberi.—There were eleven cases of beriberi, with one death, as against 24 in 1910.

Pellagra.—In the year 1910-11, STANNUS observed a number of cases of a skin eruption among the inmates of the Central Prison at Zomba, which he diagnosed as pellagra.

Leprosy.—Only four cases of leprosy appear in the returns. Twenty cases however were observed in the Lower Shire district (population 24,940), and 33 in the Ruo district (population 26,680). The disease has a higher incidence in the neighbourhood of Lake Shirwa in the Zomba district, and a comparatively large number of cases are reported to exist in the Upper Shire district.

G. C. L.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. I.] 1912. [No. 6.

PELLAGRA.

Roberts (Stewart R.). **Pellagra: History, Distribution, Diagnosis, Prognosis, Treatment, Etiology.** 272 pp. With 89 special engravings and a coloured frontispiece. 1912. London: Henry Kimpton. [12*s*. net.]

This is a useful well-illustrated book written for the student and the practising physician. The author tells us that pellagra is not contagious, a necessary statement in Georgia where he says he has known unfortunate patients shunned by their timorous relatives. Like other writers he agrees that it is not inherited though it may be a cause of race degeneracy.

It is estimated that there are now 2,500 cases of pellagra in Georgia, or one fourth of the total number of individuals attacked in the United States. Professor Roberts gives among the types of the disease an acute or fulminating form which lasts from one week to three months and progresses rapidly to death. He proposes to substitute for Strambio's term, pellagra *sine* pellagra, or pellagrous disease without skin lesions, "pellagra *sine* exanthemata" as being less misleading. [But is it necessary to coin the hybrid "dermotagra" for rough skin?]

The chapter on the changes in the nervous system, which is the longest in the book, is enriched by many excellent photographs contributed by Dr. E. Bravetta of the Mombello asylum, near Milan. Stress is laid upon the undoubted fact that pellagra in the United States, as compared with the disease in Europe and Egypt, is more severe, more rapidly progressive and proportionately more fatal.

In discussing prognosis the author reminds us that recovery from the skin lesions does not mean that the patient is cured, that a gradual increase of weight is the best sign of general improvement, and that surgeons should be wary how they operate upon pellagrins.

Under the heading of treatment he writes no individual can correctly be said to be cured unless at least two years have elapsed during which the patient has shown constant improvement in health and no return of pellagrous symptoms. The author insists upon the importance of ascertaining whether any

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other disease is present, and advises a careful search for tubercle, malaria; entozoa and syphilis.

Everything should be done to increase the resisting power of the pellagrin. Arsenic in large doses is praised as the best drug, for instance, Fowler's solution, five drops two or three times daily, increased by one drop every day "until untoward effects begin. Some patients will continue up to twenty or twenty-five drops at a dose, but, as a rule, they do not stand well over fifteen drops three times a day." In addition to Fowler's solution by the mouth, cacodylate of soda (3-5 grains hypodermically two or three times a week) is also praised. Arsenic is to be continued from one to three months after all the symptoms have disappeared and is to be given again for about a month during the following spring.

Atoxyl, soamin and salvarsan are also commended and the author has used transfusion in three cases with temporary improvement, but two of the patients subsequently died and the third was not cured.

With regard to diet, the patient is to be fed as generously as his digestive tract will allow; meat, eggs, butter, and fats should be given in large quantities.

The final chapter of this interesting book considers the unknown cause of pellagra and the author states that he inclines towards SAMBON's theory of infection.

[In spite of some errors of spelling of proper names and of Italian words, this would seem to be the best monograph on pellagra in the English language.]

F. M. Sandwith.

ETIOLOGY.

BERTARELLI (E.). **Osservazioni Critiche a proposito del Problema Eziologico della Pellagra.** [Critical Observations on the Etiological Problem of Pellagra.]—*Gazz. d. Ospedali e d. Cliniche.* 1912. Aug. 4. Vol. 33. No. 93. pp. 961-963.

The author discusses the various theories and is of opinion that it is only the doctors on the spot, living in pellagrous districts, with eyes and brain specially concentrated on the disease, who can succeed in determining whether we have to deal with an intoxication or an infection. He pleads for such patient research as eventually revealed to us the mystery of malaria. He considers that the maize theory is supported by the recent work of VOLPINO and others, who showed that pellagrins exhibited a specific anaphylactic sensibility to the poison of diseased maize when it was injected subcutaneously.

F. M. S.

NICHOLLS (Lucius). **Tropical Pellagra.**—*Jl. Trop. Med. & Hyg.* 1912. Aug. 15. Vol. 15. No. 16. pp. 241-245.

The author reports nine cases occurring in the island of St. Lucia during a period of three months. He considers that the condition of the organs at two post-mortem examinations, "the extraordinary emaciation, the small haemorrhages or diapedesis of red blood corpuscles throughout the organs, the lessened coagulability of the blood, the absence of much temperature or congestion of any organs, the presence of fatty degeneration—very similar in degree to what is seen in some cases of beriberi—and the condition of the tongue and gums, indicate that the disease is more nearly allied to such diseases as scurvy and beriberi than to any germ disease."

F. M. S.

NICHOLLS (Lucius). **Pellagra. "Sandfly Protozoon"** *versus* **"Zeist" Theory.**—*Jl. Trop. Med. & Hyg.* 1912. Oct. 15. Vol. 15. No. 20. pp. 305-306.

The author, writing from St. Lucia (West Indies), says that he is not an ardent supporter of either maize or insect-borne causation, but he objects to attempts "to force all factors to fit a preconceived theory."

He narrates the case of a middle-aged woman who by reason of an ulcerated leg was unable to work; having no friends to support her, she limped to a damp valley in the island and subsisted for some weeks upon "yams, plantains, farina and corn meal"; this mouldy corn-meal [? maize] was said by a negro not to be fit for pig food. She was found by the author to be suffering from typical pellagra—"dementia, dermatitis, sore mouth, diarrhoea, refusal of food, emaciation, shrinkage of liver and spleen and slightly lessened coagulability of the blood." During three years at least no other case of pellagra has been seen in this part of the island, but the author adds that the inhabitants rarely eat corn-meal.

F. M. S.

SHEPPARD (W. Sidney). **The Etiology of Pellagra.** [Correspondence.]—*Brit Med. Jl.* 1912. Dec. 28. p. 1773.

The author records the existence of pellagra in Singapore among the very poorest class who subsist almost entirely on rice. He states that maize can have nothing to do with its causation in the Straits Settlements and he doubts whether simulium occurs there.

F. M. S.

LAVINDER (C. H.). **Certain Aspects of the Pellagra Question.**—*Southern Med. Jl.* 1912. Aug. Vol. 5. No. 7. pp. 476-482.

This is a paper read before the State Medical Association at Birmingham, Alabama, and deals mostly with the difficulties surrounding the etiology and the diagnosis of the disease.

F. M. S.

DEVOTO (Luigi). **Aetiologie und Klinik der Pellagra.**—*Wiener Med. Wochenschr.* 1913. Jan. Vol. 63. No. 1. pp. 20-28.

The author met with pellagra for the first time in 1899 when he was elected professor of medicine in Pavia. Finding that for the last twenty years clinical physicians had neglected the study of the disease, and had resigned it to psychologists, hygienists and pathologists, he instituted a pellagra section in his clinic and claims that this is the first time this has been done since the Emperor Josef II created one in Legnano, near Milan, under the well known STRAMBIO. He maintains that most students of pellagra, unlike LOMBROSO, have neglected to study the clinical forms and the changeable course of the disease.

BIANCHI and AGAZZI's researches which show that in various types of pellagra, there is an increase of large mononuclear cells (twelve to eighteen per cent.) have been claimed by SAMBON as an additional proof of his protozoal theory, but the author points out that this increase is also seen in lymphatic leukaemia, chronic alcoholism and small pox, and he suggests that this is not evidence of protozoal infection, but rather of deficiency of nutrition. He insists upon the importance of discovering the earliest symptoms of the disease (heaviness of head, tendency to melancholia, apathy, restlessness, loss of flesh, debility, indigestion, flatulence, giddiness, etc.) during the winter preceding the first appearance of the eruption in March. It is precisely during the winter that the economic conditions of the peasant become worse and worse and his diet is gradually narrowed down to maize, often of inferior quality. The author is a confirmed upholder of the maize theory, though not necessarily of bad maize as LOMBROSO taught, and he quotes the work of BEZZOLA who since 1903 has been experimenting on guinea pigs and mice. He finds:

1. An exclusive diet of maize is an insufficient food for guinea pigs and they die after a few weeks.
2. If bran and vegetables or vegetables alone are added to the maize the diet is nourishing, but long continuance of this mixed diet may lead to a constant group of symptoms chiefly characterized by acute or chronic inflammation of stomach and intestines of the guinea pigs and by marked temporary loss of hair.
3. It is almost immaterial whether the maize is good or bad.
4. Mice on the other hand are not affected by a maize diet extending over twelve months.

LUKSCH repeated BEZZOLA's experiments and found the same results with rabbits that the latter had seen with guinea pigs. The author is a strong disbeliever in SAMBON's theory and considers that the arguments against it are much stronger than SAMBON's criticisms against the maize theory. He also insists that the peasant shows signs of pellagra before the simulium appears in the spring months.

The author states that in eight Italian provinces there has been a diminution since 1889 of 75 per cent. of pellagrous individuals so that it is now difficult to find 100 typical cases during the pellagra seasons. He asks: "Is the simulium disappearing or is the protozoon ceasing to be infectious?" He concludes by maintaining that the diminution of pellagra in Lombardy is due to lessened consumption of maize, to edicts forbidding the use of bad maize and to improvement in the economic conditions, because a mixed diet has become habitual among the peasants and the fight against pellagra is now universal.

F. M. S.

SYMPTOMATOLOGY.

STIEFLER (Georg). **Das Fazialisphänomen in der Symptomatologie der Pellagra.** [The Facial Phenomenon as a Symptom of Pellagra.]—*Neurol. Centralbl.* 1912. Dec. 1. No. 23. pp. 1483-1488.

This is a study of a symptom described by NEUSSER and found to be present in most of the cases he studied in Austria and Roumania. It consists of mechanical excitability of the facial nerve and is sometimes called "Chvostek's symptom." It used to be thought that this symptom was peculiar to tetanus and according to FRANKL-HOCHWART, it consists of four degrees (1) spasmodic reflex of the whole face produced by tapping in front of the ear, (2) reflex of nostrils and corner of the mouth, caused by tapping under the zygomatic arch, (3) quivering of mouth only, (4) reflex induced by gentle stroking of the face.

In May and June of 1906 and 1907 the author examined 140 obviously pellagrous peasants of the Italian part of the south Tyrol, three-fifths men and two-fifths women, mostly aged between twenty and fifty. They were inmates of the Pellagrosarium in Rovereto and of the Pergine asylum, some chronic, others of recent development. Notes are given of fifteen cases in which the reflex was obtained, and eleven of them showed the quivering of the mouth muscles not always equally marked on the two sides. He saw no cases resembling tetanus which NEUSSER had done and he suggests that his different results may be due to this cause. He considers that the reflex cannot be of assistance in diagnosing doubtful cases of pellagra, because the phenomenon occurs in tetanus and in some other nervous diseases.

F. M. S.

BONDURANT (E. D.). **Terminal States in Pellagra resembling General Paresis, with Report of Five Cases.**—*Jl. Nerv. & Ment. Dis.* 1912. Nov. Vol. 39. No. 11. pp. 734-738.

Among fifty pellagrous lunatics studied in Alabama, the author has met with five who presented symptoms strongly suggestive of general paralysis. Syphilis had existed in one case; in the four others it was denied and in two of them the Wassermann reaction was negative. Three of the patients died but no autopsy seems to have been made. The author wishes to draw attention to the possibility of a typical general paralysis of the insane being of pellagrous origin.

F. M. S.

HOAG (D. E.). **Pellagra: Observations on some of its Nervous Manifestations.**—*Jl. Amer. Med. Assoc.* 1912. Oct. 19. Vol. 59. No. 16. pp. 1445-1446.

This paper, written by a neurologist entirely from the clinical point of view, was read in the section on Nervous and Mental Diseases at the last meeting of the American Medical Association. The author considers that the whole mental and neurological picture of the pellagrous lunatics whom he has seen is indicative

of a toxaemia, with a subsequent degenerative change in cells of the central nervous system, notably the cortex cerebri.

" The most definite changes in the spinal cord would point to an involvement of the lateral tract and cross pyramidal tracts. In general, the nervous symptoms most clearly resemble a neurasthenia interspersed with periods of excitement and delirium. Some cases, with mental defect, slurring speech, tremor of the facial muscles and of the tongue, suggest a general paresis."

F. M. S.

WOOD (Edward J.). "**Pellagra** *sine* **Pellagra.**"—*New York Med. Jl.* 1912. Aug. 3. Vol. 96. No. 5. pp. 218-220.

The author holds strongly the view that pellagra never occurs without some skin lesions and even urges that it would otherwise be impossible to diagnose this disease from sprue, dysentery and " many sub-tropical diseases which occur in the southern States." But he recognises that slight disturbances of the skin are often overlooked by both patient and doctor and he quotes the case of an old woman who had been under his constant care for two years; intractable diarrhoea, " typical pellagrous stomatitis," and symmetrical erythema around the anus, all preceded by some months a very definite furfuraceous desquamation of the backs of the hands, which occurred after the patient had been placed out of doors in the spring sunshine.

As Chairman of the Pellagra Commission in North Carolina, he draws attention to the fact that an early diagnosis is, as regards treatment, quite as important in pellagra as in tuberculosis.

F. M. S.

SNYDER (J. Ross). **Pellagra in Children. (A Preliminary Report.)** —*Amer. Jl. of Diseases of Children.* 1912. Sept. Vol. 4. No. 3. pp. 172-179.

Letters addressed by the author to sixty physicians, apparently in the State of Alabama, where pellagra is well known, elicited replies which strongly suggest that children in towns enjoy immunity to a considerable degree. In answer to a question as to the youngest age when undoubted pellagra has been observed, three correspondents stated two months, four months, and five months, while others had never seen it earlier than at the age of thirteen or fourteen years. The answers of 31 correspondents show that pellagra is met with much more frequently after the eighteenth month.

Other answers tend to show that about ten per cent. of all pellagrins are children under fifteen years of age, and that, as a general rule, marked nervous symptoms in pellagrous children are rare, for the eruption may often be the only symptom prominently manifest.

One case is quoted of a pellagrous mother who nursed her child until the baby was six weeks old when she died. The infant was then fed on malted milk and developed pellagrous erythema several days after the mother's death. The author considers that the possibility of a pellagrous mother transmitting the disease by her milk has not been disproved.

F. M. S.

PELLAGRA IN THE UNITED STATES.

HARRINGTON (Arthur H.). **Pellagra in Rhode Island.**—*Boston Med. & Surg. Jl.* 1912. Nov. 21. Vol. 167. No. 21. pp. 731-733.

The scope of this paper, which was read before the Pellagra Conference at Columbia last October, is chiefly historical and shows that pellagra has existed undiagnosed at the State Hospital for the Insane at Howard since 1891. Until 1910, when the first case was recognised as pellagra, the lunatics were thought to suffer from "tropho-neurotic sunburn." Since 1910, there have been 37 cases diagnosed with 16 deaths.

The author relates five other cases which have occurred in the district, showing that pellagra is not confined in Rhode Island to the State Institution.

F. M. S.

LAVINDER (C. H.). **The Prevalence and Geographic Distribution of Pellagra in the United States.**—*U.S. Public Health Rep.* 1912. Dec. 13. Vol. 27. No. 50. pp. 2076-2088. With 1 map, 3 charts and 3 tables.

A systematic attempt has been made by the Surgeon General of the Public Health Service to collect statistical information relative to pellagra in the United States. In answer to letters and cards sent out to individual practitioners and superintendents of hospitals, asylums and other institutions, replies have only been received from one-fourth. From eight of the Southern States, 4,657 answers have been received recording 15,870 cases during the five years, 1907-1911, with an average mortality of 39·1 per cent. This death rate, which is extremely high for pellagra, as judged by other countries, varies from 30·9 in South Carolina to 55·5 in Virginia. In the eight States the white patients more than doubled the coloured cases, but these figures do not include reports from the lunatic asylums. The charts show that there are more than double the number of cases in country districts as compared with towns, while 6,641 cases are reported among the poor, 5,359 are in moderate circumstances and 1,102 are believed to be "well to do." The comparatively large number of cases occurring in people of easy circumstances is a peculiarity of the United States, though the author quotes the saying of an Italian writer, DALLA BONA: "It does not always spare the palace." As in Italy the Americans find that there is constantly only one case in a house or family. The map shows very clearly that in all the States to the south pellagra is prevalent, that it occurs sporadically in those north of them and that it has not yet been recorded from nine in the further north and to the west.

The author considers that pellagra has already claimed during the last five or six years, not less than 30,000 victims in some thirty States and that the matter has reached the dignity of a public health question of national importance.

F. M. S.

Pellagra in Illinois. Condensed Report of the Illinois Pellagra Commission.—*Arch. Internal Med.* 1912. Aug. 15 & Sept. 15. Vol. 10. Nos. 2 & 3. pp. 123-168 & 219-249.

ORMSBY (Oliver S.). [Medical Secretary of the Commission.] **Pellagra.**—*Jl. Cutaneous Dis.* 1912. Oct. Vol. 30. No. 10. pp. 589-607.

Pellagra was first recognised in the State of Illinois in June 1909, in an asylum, and with commendable promptness the Governor of the State, before the end of the year, appointed a commission of ten doctors to investigate the disease. Excluding cases remembered before 1909 and all doubtful cases reported since that year, they now believe that there have been at least 500 pellagrous patients in this one State, with a mortality in ten institutions of 46·3 per cent. More than half the cases occurred at the Peoria State Hospital which had a total population of 2,100, and 8·4 per cent. of the lunatics showed definite symptoms of pellagra.

Yet " none of the employees suffered from the disease in spite of the fact that they were exposed fully as much to the bites of insects and drew their food and water supply from exactly the same source as the patients. This freedom from pellagra on the part of physicians, nurses, attendants and other employees, has been absolute in all the institutions."

The skin lesions of more than 200 patients were carefully examined and coincided as regards site and symmetry with the accounts of previous writers, but less atrophy was noted than in European and Egyptian writings. In a large number of sections made—

" the general picture was that of an angio-neurotic process, and resembled to a marked extent that seen in multiform erythema. The most marked change was noticed in the superficial part of the corium, almost all infiltration occurring in the pars papillaris. The specific findings are as follows: With a low power, the stratum corneum was thickened, the stratum granulosum and rete practically normal. The upper portion of the corium showed inflammatory reaction and the connective tissue appeared oedematous. With a high power the hyperkeratosis was seen to be well marked. Here and there, areas of parakeratosis were present, as evidenced by the presence of nuclei extending to the upper layer of the stratum corneum. Many pigment granules were present. The rete was practically normal, except in places where its integrity was interfered with by infiltrating cells. In the papillary layer cellular infiltration was quite marked, particularly in the region of blood vessels. Collagen and elastin were present, the former showing oedematous changes. The deeper parts of the corium were comparatively normal. In parts of the papillary layer elastin was absent."

The Commission do not feel justified in making any definite statement regarding the nervous and mental symptoms of pellagra and they doubt the existence of any " pellagrous insanity." But they emphasize the great and unexplained susceptibility of the chronic insane to pellagra.

Detailed examinations of faeces, blood, and urine proved negative and the report states that no support could be found for regarding pellagra as a complication of amoebic dysentery and " nothing whatsoever suggestive of a protozoal infection was encountered." Seven post-mortem examinations made showed fatty degeneration of liver cells, non-amoebic intestinal ulceration in three instances, more or less interstitial nephritis, and pigmentary changes in the heart muscle. The complete examination of the spinal cords is not yet published but the summary states that—

> "the nervous system presents a picture of axonal chromatolysis involving especially the Betz and larger pyramidal cells of the precentral convolutions and the cells of the nuclei in the cerebellum, pons, medulla and cord, as well as the posterior root and sympathetic ganglia."

Attempts to transmit pellagra to monkeys and guinea pigs completely failed.

Complement fixation tests by Noguchi's method gave "results which cannot be regarded as specific at present. Negatives with positive cases and positives with normal sera have been encountered too frequently to permit of any interpretation."

Anaphylactic tests by Von Pirquet's method, substituting maize extracts for tuberculin, proved negative. An interesting experiment devised by Captains Siler and Nichols tends to discredit the causal relationship of maize. Two cottages in the Peoria asylum, each fitted for about sixty patients, were filled with non-pellagrous chronic lunatics. One cottage was placed on a generous maize diet, the other on a maize-free diet. At the end of twelve months the maize eaters had four certain and one doubtful case of pellagra, while the maize-free group included five certain and five doubtful cases of pellagra. As an argument in favour of the deficiency of nutrition theory it was found that an increase of meat to the dietary diminished the number of pellagrous cases, while they were increased in another asylum when the meat supply was reduced. There are said to be 65 species of simulium in the world; 15 have been found in the United States, nine of which are known to occur in Illinois.

> "The relation of simulia to pellagra, hypothecated by Sambon, finds but little support from the researches we have been able to make. The particular variety, *S. reptans*, which he claims to be of world-wide distribution, is said by Professor Forbes (State Entomologist) to be unknown in North America as yet except in Greenland."

Conclusions.—

> "1. Pellagra is a disease due to infection with some living microorganism.
>
> "2. A possible habitat for this parasite in man is the intestinal canal.
>
> "3. Deficient animal protein in the diet may constitute a predisposing factor in the contraction of the disease.
>
> "4. The number of cases of known pellagra renders this disease a decided menace to the public health of this State.
>
> "5. Careful search for and investigation of suspected cases outside the State hospitals for the insane is extremely desirable in view of experience elsewhere."

[The complete report of this Commission is shortly to be issued. It will apparently be the most valuable and original contribution to the literature of pellagra which has yet appeared in the United States.]

F. M. S.

BABCOCK (J. W.). **How Long has Pellagra Existed in South Carolina? A Study of Local Medical History.**—*Amer. Jl. of Insanity.* 1912. July. Vol. 69. No. 1. pp. 185-200.

In December 1907 pellagra was officially recognised as being present in the State Hospital for the Insane, Columbia, South Carolina, and in 1910 this diagnosis was made in 135 cases or 20 per cent. of the admissions. The author has made a diligent search through all the case papers of former years and though the records are often imperfect he believes that ever since the hospital was opened in 1828, there has been an elusive and puzzling disease which may well have been pellagra, sometimes complicated by scurvy. In the early days of the hospital the prevailing fatal diseases were recorded as chronic diarrhoea or dysentery, while of later years he has discovered vague diagnoses such as inanition, exhaustion, consumption and marasmus. He suggests that under these terms some cases of pellagra may have been concealed.

F. M. S.

LEE (Roger L.). **A Case of Pellagra that had not been outside of New England for Eighteen Years.**—*Boston Med. & Surg. Jl.* 1912. Sep. 26. Vol. 167. No. 13. pp. 435-436.

The patient, a white dry-goods clerk, after some indigestion in the spring months for the past three years, began to suffer in May, 1912, from red, burning hands, for which no cause could be assigned; this was followed by loss of appetite, weight and strength, epigastric discomfort, salivation and diarrhoea. On examination at the Massachusetts General Hospital in July, he was found to have symmetrical erythema of face, hands, wrists and nape of neck. Normal white skin was seen under a ring on a finger. His tongue and anus were abnormally red and his mental state was confused and depressed, with occasional excitement. His loss of weight amounted to 59 pounds in a year. He rapidly improved on good food. His wife (who was in good health) and he lived on ordinary diet under fairly hygienic circumstances. "They ate ordinary commercial wheat flour and denied absolutely eating maize or other maize products." It could not be discovered that the patient had been exposed to any simulium bite. "The only possible peculiarity of diet for some years past was that two years ago the patient and his wife bought a large amount of potatoes, and ate a great deal of that particular supply during one winter, but not to any great excess or to the exclusion of the ordinary mixed diet."

[Sporadic cases have already been reported from Massachusetts and other northern States.]

F. M. S.

PELLAGRA IN ITALY AND OTHER COUNTRIES.

LAVINDER (C. H.). **Pellagra in Italy. A Note on the Prevalence during the Years 1881-1899-1910.**—*U.S. Public Health Rep.* 1912. Nov. 1. Vol. 27. No. 44. pp. 1778-1779.

This is a copy of the table of official statistics in Italy during the three years named, taken from the *Rivista Pellagrologica*

Italiana of July 1912. The Rivista is a publication which appears twice a month and is the official organ of the Permanent Committee of the International League against Pellagra and of the Pellagra Commissions of Italy. The total number of pellagrous cases in 1881, when the disease in Italy reached its zenith, was 104,067; in 1899 there were 72,603 cases; and in 1910 there were only 33,869 cases in spite of a steady increase of the rural population. Whether the figures are accurate or not there is ample reason for believing that the disease in Italy is certainly decreasing both in number of cases and virulence. The decrease evidently began before July, 1902, when the national law against pellagra became effective.

F. M. S.

GOODHUE (E. S.). **Pellagra in Hawaii: Report of a Case.**—*New Orleans Med. & Surg. Jl.* 1912. Aug. Vol. 65. No. 2. pp. 120-137.

The author states that the American Indian, who has grown and eaten maize for generations, is free from pellagra. He reports the case of a female native who has never been out of Hawaii and who has never eaten maize in any form. He believes that this is the first case which has been reported from the islands of the Pacific. The patient's illness began in November 1910, some fifteen months before this report was written. The prominent symptoms at the onset were: burning pain in the epigastrium, pyrosis, constipation with occasional diarrhoea. In the summer of 1911 to these were added loss of memory and appetite, "some fever," great thirst, ringing in ears, epileptiform attacks, which have continued. In the autumn "dermatitis covered back of hands, left elbow, feet, legs, cheeks and forehead. There was oedema and subsequent exfoliation. Then pigmentation of affected areas, more pronounced upon hands, feet and legs than elsewhere." In December 1911 she became bed-ridden with loss of knee jerk and tenderness on pressure over spinal region, also "extensor muscles of arms, hands, feet and legs much atrophied with spastic paraplegia."

The author considers "the case is one of unmistakable pellagra."

[The photographs of the patient are not published with the paper.]

F. M. S.

DIAGNOSIS.

RAUBITSCHEK (Hugo). **Zur Frage einer spezifisch-diagnostischen Reaktion bei Pellagra.** [A Specific Diagnostic Reaction in Pellagra.]—*Deut. Med. Wochenschr.* 1912. Nov. 14. Vol. 38. No. 46. pp. 2169-2171.

Writing from Czernowitz, the author draws attention to former papers which seem to prove the deleterious effects on white mice and guinea pigs of an exclusive maize diet, whether of good or bad quality, so long as the animals are exposed to sunlight. He suggests that an exclusive diet of other cereals, such as rice, millet or wheat, might under similar circumstances produce the same phenomena. He states that some years ago he cured mice which were suffering from the effects of maize and sunlight by keeping them in darkness, though the diet was unaltered. Excluding light from the skin of pellagrous lunatics by means of darkened rooms, red windows, ointment and bandages, seemed to have favourable results upon the few individuals on whom these experiments were tried.

In consequence of the view held by many Italian writers that pellagra is an infectious disease with some micro-organism in the blood, and because of TIZZONI's claim that he has found the "streptobacilli" of pellagra in the blood, cerebro-spinal fluid, and organs after death, the author thought it right to re-investigate this point. He now states that he was unable "in several hundred examinations to isolate any germs in any single instance." He complains that when he invited TIZZONI to send him cultures of his bacillus, he received nothing but good advice. In about 100 cases he was able to satisfy himself that there is no diagnostic value in TIZZONI's belief that pellagrous blood serum will agglutinate minute quantities of rabbit's blood without haemolysis. He is equally sceptical about the serum reactions described by GOSIO and BASS. Some experiments of his own to try and produce a cutaneous or ophthalmic or subcutaneous reaction on pellagra patients by means of different aqueous extracts of maize also proved useless.

His conclusions are:—

> In the blood and in the organs of pellagrous patients no specific germs can be found by our present bacteriological methods. The blood of such patients, examined by our present cultural methods, proves to be exceptionally free from germs.
>
> As tested by our present serological methods, no anti-bodies nor material exist in the serum of pellagrous patients which are peculiar to pellagra.
>
> The etiology of pellagra is photodynamic and the disease is produced by a diet of good or bad maize, which however can only display its deleterious action when the patient is brought under the influence of sunlight. It is possible that other forms of diet (rice, millet, &c.) might produce similar disease under the influence of sunlight.

F. M. S.

TIZZONI (Guido). **Ueber die immunitäre Reaktion des Blutes bei der Pellagra. Vorläufige Mitteilung.** [The Immunity Reaction of Blood in Pellagra.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1912. Dec. 4. Vol. 67. No. 3. pp. 175-177.

The author continues an account of his researches in Bologna and claims to have proved that (1) ordinary laboratory bouillon exercises no influence on the red blood corpuscles of the rabbit, which form a sediment and remain intact a comparatively long time without changing; (2) the blood serum of healthy man added to similar bouillon and rabbit's blood, agglutinates the blood cells to a slight degree and always haemolyses them (normal hetero-agglutination and heterolysis); (3) the blood serum of pellagrous patients on the other hand, when similarly treated, agglutinates the blood cells much more quickly and more thoroughly but never develops a haemolysing action. He maintains that in the blood of pellagrous patients there is present an anti-haemolysin which counteracts the haemolytic capacity of normal heterolysin.

[See RAUBITSCHEK's paper above.]

F. M. S.

RONDONI (Pietro). **Sulla Ipersensibilità dei Pellagrosi al Mais.** [The Hypersensitiveness to Maize of Pellagrous Individuals.] —*Lo Sperimentale.* 1912. Sept. 26. Vol. 66. No. 5. pp. 447-472.

The author set himself the task of controlling on human beings the recent work of VOLPINO, MARIANI, BORDONI and ALPAGO-NOVELLO, and of noting the general and local phenomena which occurred after the injection of maize intramuscularly. He obtained his "subjects of experiment" from pellagrous convalescents from Città di Castello, from lunatics of that town and from a hospital in Florence.

Whereas VOLPINO experimented with maize bought from a merchant for feeding animals he thought it wiser to procure maize directly from the domestic store of pellagrous victims. After a careful disinfection of the skin the injections were made in the thigh or buttock, usually preceded by a Von PIRQUET test to see if the subject reacted to tuberculin. Notes of all the experiments are given.

In all 33 pellagrous and 30 non-pellagrous individuals were injected with an extract of maize, while eight of the pellagrous also had an injection of an infusion made from wheat or chestnuts.

The author never found a violent reaction as described by other writers and his conclusions are: (1) In comparison with the non-pellagrous, recent cases of pellagra and convalescents from that disease exhibit more often and more certainly a definite reaction (slight rise of temperature, malaise, headache, excitability, sleeplessness) following on the subcutaneous injection of an extract of spoiled maize.

(2) This enhanced sensibility of the pellagrous *may be* interpreted as an anaphylactic reaction to some unknown and therefore undefined factors of the maize extract and may be in connection with maize diet by some kind of sensibility of the organism through the alimentary tract.

F. M. S.

HIRSCHFELDER (Arthur D.). **Gibt es besondere fluoreszierende Substanzen im Serum bei Pellagra?** [Fluorescent Substances in Pellagrous Serum.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1912. Oct. 29. Vol. 66. No. 7. p. 537.

This paper from the Psychiatric Clinic of the Peoria General Hospital, Illinois, and from the Medical Clinic of Johns Hopkins University, is in antagonism with RAUBITSCHEK's* idea that a fluorescent substance is necessary for a skin disease, sometimes fatal, which occurs in white mice which have been fed on maize and also exposed to sunlight.

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* RAUBITSCHEK. **Zur Kenntnis der Pathogenese der Pellagra.** *Centralbl. f. Bakt.* 1. Abt., Orig. 1911. Vol. 57. p. 193.

The author states that in 1910, a year before RAUBITSCHEK's paper appeared, he had searched for such fluorescence in the blood serum of five patients suffering from acute and pronounced pellagra. He found that the serum of normal individuals showed a certain fluorescence and that the serum of pellagra patients exhibited only a similar fluorescence.

F. M. S.

TREATMENT.

NICOLAIDI (Jean). **New Treatment of Pellagra, with the "Organo-Mineralized Radio-Activated Serum" of Dr. Jean Nicolaidi, Paris, France.**—*Southern Med. Jl.* 1912. Aug. Vol. 5. No. 7. pp. 464-475. With 14 photographs.

After working at pellagra with his father, a physician in Roumania, the author set himself the task of (1) neutralizing the "toxine" or the "virus" which pellagra produces in the organism, (2) awakening the intracellular activities and the reparative forces tending to remedy the deficiencies caused by the disease. For this purpose he adopted an "artificial organo-mineralized serum" which he rendered radio-active by a special process. He states that he "was able to unite all the elements extracted from the horse serum by evaporation in the vacuum, which he treated subsequently by means of a solution saturated with carbonic acid containing all the organic and mineral salts of the blood plasma." In 1910 he was appointed by the Roumanian Government to conduct some experiments in a hospital at Craiova and these were favourably reported on by the chief physician of the hospital and the senior physician of the lunatic asylum who wrote:—"After a certain number of injections (20 to 25) some of the patients were cured, some considerably improved, [results] which have not been obtained by all the different treatments applied during months in the asylum."

In the autumn of 1911 the author was appointed by the Italian Government to undertake similar experiments in Udine, under the control of Professor ANTONINI, the well-known director of the lunatic asylum there.

The number of cases treated is not mentioned, but the Italian physicians (GRILLO and MAJ) reported that nearly all the patients treated "have shown a marked improvement in a short length of time." Most of the patients were able to resume their occupations which they had long since abandoned. Professor ANTONINI considered that "we have found the means of fighting against pellagra at the moment when energetic methods may be necessary." Professor BLANCHARD saw some of the patients in Craiova when the experiments were finished and stated in a lecture at the Academy of Medicine in Paris that the results obtained were most remarkable.

F. M. S.

REPORTS.

LAVINDER (C. H.). **The Association for the Study of Pellagra. A Report of the Second Triennial Meeting held at Columbia, S.C.,** [South Carolina], **Oct. 3-4, 1912.**—*U.S. Public Health Rep.* 1912. Nov. 1. Vol. 27. No. 44. pp. 1776-1778.

At this congress 65 communications were presented on the various phases of pellagra and covered the etiology, epidemiology, statistics, American history, diagnosis, laboratory investigations, clinical features, treatment and miscellaneous aspects of the disease. One of the resolutions stated that the ultimate cause of pellagra is unknown but that in view of the incrimination of spoiled maize "measures should be taken by the proper authorities to prevent its sale and consumption as food."

Hope was expressed that the Congress of the United States may appropriate sufficient funds for the continuance and extension of anti-pellagra research.

Some of the delegates entertained "a feeling, almost a conviction, that the disease is of an infectious nature and probably insect-borne."

Dr. C. H. LAVINDER of the Public Health Service was elected the new President of the Association. [Pellagra students are anxiously waiting for the published Proceedings of this meeting, though none of the contributions seem to have been epoch-making.]

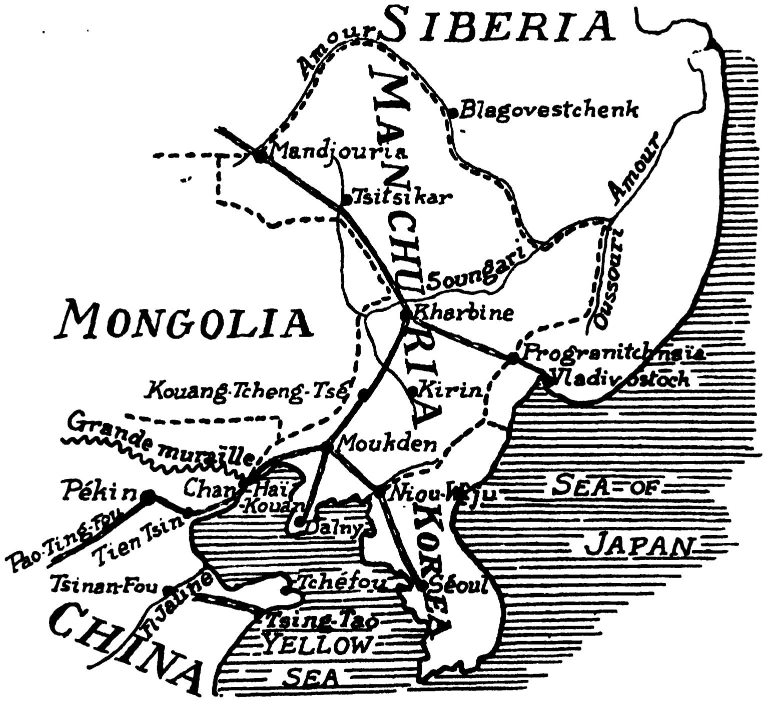
F. M. S.

PLAGUE.

PLAGUE IN THE FAR EAST.

LANCELIN. **La Peste de Mandchourie. Sa Prophylaxie.**—*Arch. de Méd. et Pharm. Nav.* 1912. Nov. Vol. 98. No. 11. pp. 353-374.

It seems certain that the outbreak began in Eastern Mongolia in September 1910, and was caused by an epizootic in the tarabagans. The trappers brought the infection to the frontier railway station Manchuria, where the first death occurred on the 25th of October, 1910, followed by 37 more in the space of six days. Plague rapidly spread along the railway line since the Chinese had not informed the Russian authorities of the occurrence. Hence it was not long before it reached Tsitsikar. Kharbin was infected on November 9th. On December 31st two cases were discovered in the train going from the junction between the Russian and Japanese lines at Kouang-Tcheng-Tse, which had become a plague centre shortly before, to Mukden. The first death at Mukden took place on January 3rd, 1911. From this date the scourge spread with great rapidity. The whole district between Kharbin and Mukden was ravaged. Deaths occurred by hundreds a day at Kharbin and the neighbouring Chinese town Fouchiatien, with populations of 30,000 and 35,000 respectively.



SKETCH MAP OF MANCHURIA AND NEIGHBOURHOOD.

[From the map illustrating LANCELIN'S paper. The French spelling for names of towns and rivers, &c., is retained.]

Notwithstanding the stringent precautions taken by the Japanese railway authorities on their South Manchurian line, the epidemic extended to the Kouang-Toung peninsula, and reached Dalny. The Korean railway line also carried the infection.

The pestilence travelled south, and defying the Sanitary Cordon at the Great Wall, and the quarantine station Chan-Hai-Kouan, it attacked Tientsin, Pekin, and Pao-Ting-Fou in succession. Going eastwards it visited Tsinan-Fou, and crossing the Yellow River invaded Tchefou. South of the Great Wall the epidemic raged with less violence than in Manchuria, and it began to subside in February. In Manchuria on the other hand, its ravages continued till the middle of April, when they were brought to a sudden close, but not before the depopulation of whole towns.

The administrative organization for the control of the epidemic was subdivided.

Russia organised the preventive measures in Kharbin, and guarded the trans-Siberian railways and the frontiers along the Amour and Oussouri rivers. The Chinese Government protected Petchili by a sanitary cordon along the Great Wall and by surveillance of the Mukden-Pekin railway. The Japanese were responsible for the sanitary administration of the South Manchurian Railway, Korea, and the peninsula of Kouang-Toung. In the foreign concessions the plague campaign was carried out by the country concerned.

At Kharbin the administration, the head of which was Dr. DAUTCHAKOFF of the Russian Navy, was granted full powers. The city was divided into four sections, to each of which a personnel of medical officers, inspectors, attendants and police was allotted. The inhabitants of each section were obliged to wear a distinguishing brassard, and no communication was allowed between them. A military guard was placed on the bridge joining Kharbin with Fouchiatien. Every house was visited daily; the residents were inspected and their temperatures were taken. Suspicious cases were immediately reported to the head office; the patient was caused to expectorate on a piece of paper, the outside of which bore his name and address and date, which was sent to the laboratory. In febrile cases, when neither cough, expectoration, nor physical signs were present, bacteriological examination of the blood often allowed a diagnosis of plague to be made. Since admission to a plague hospital was equivalent to a sentence of death, the greatest care was taken to prevent any errors.

There were many railway wagons available at Kharbin unused since the Russo-Japanese war, which were of great service for the isolation of suspected cases and of contacts. A thousand of these were soon required. Each wagon could accommodate 20 people. Suspicious febrile cases with a temperature of 37·9° C. and over, without cough or sputum, were placed two in a wagon; if the temperature was 37·2° C. four were allotted. Apparently healthy contacts were accommodated by twenties to each wagon. The employment of the thermometer was of the greatest value, for by it 80 per cent. of the plague attacks were discovered.

All the public buildings were converted into plague hospitals.

Treatment with anti-pest serum or salvarsan was without success.

The patients were supplied with masks, and everyone who was employed on plague duties was inoculated with HAFFKINE's vaccine, and wore mask, goggles, overalls, wash-leather gloves, and wading boots. The mask contained a pad of wool moistened with formalin. Notwithstanding these precautions, many of the ambulance transport staff fell victims to the disease.

There were numerous cold storage railway vans at Kharbin which proved invaluable for the sterilisation of clothes and bedding by simply conducting steam from a locomotive boiler into their interior.

Plague corpses were incinerated. Some even were exhumed for the purposes of cremation. It is noted that the coolies who were employed on this work escaped infection, although "*cultures magnifiques*" of *B. pestis* were obtained from the earth clinging to the shrouds.

A military cordon was placed around the city, from which no egress was permitted. On the railway the conveyance of 3rd and 4th class passengers was stopped, and a searching medical inspection of the others was made. When a case of plague was discovered, it was removed to hospital, and the passengers who were travelling in the same carriage were kept in quarantine in it under a military guard for five days. A quarantine station was established at Manchuria for passengers bound for Europe and one at Pogranitchnaia for those going to Vladivostock.

The Chinese broke with their ancient traditions in their campaign against the plague which they carried on outside the foreign spheres of influence. The examination and cremation of corpses were permitted for the first time in their history. They followed the Russians in their defensive measures. In deference to public opinion they allowed one hospital at Fouchiatien to be conducted on native methods. It was closed at the end of a week, but in that time 18 of the 19 native doctors lost their lives.

At Mukden the Chinese acted with energy. They destroyed with fire about 300 plague houses.

Notwithstanding a Chinese guard of 750 soldiers posted along the Great Wall, a quarantine station at Chan-Hai-Kouan, vaccination and 5-7 days quarantine of all passengers from infected areas, the pestilence spread to all the large cities of Petchili. Tientsin was attacked on January 19. Precautionary measures similar to those carried out at Kharbin, were vigorously pursued. All the European troops were inoculated and confined to barracks. These provisions were effective, for only 61 deaths occurred, all in the Chinese city.

The Japanese were very thorough and autocratic in their endeavours to arrest the progress of the epidemic in their possessions. The results were remarkable, for though Dalny was infected on January 11, yet 22 days later the plague was stayed. There were 38 cases only in that town, and altogether 207 in the peninsula of Kouang-Toung.

A cordon of troops along the frontier, and 5 days quarantine of all passengers, together with a bacteriological examination of their blood, at the frontier railway station, Niou-Wiju, afforded almost complete protection to the peninsula of Korea.

C. Birt.

Murata (N.). **Die epidemiologischen Beobachtungen anlässlich der Pestseuche in der Südmandschurei, und zwar im Kaiserlich japanischen Verwaltungsdistrikte.** [The South Manchurian Plague Outbreak in the Districts under Japanese Administration.]—*Zeitschrift f. Hyg. u. Infektionskrankheiten.* 1912. Dec. 20. Vol. 73. No. 2. pp. 245-252.

The outbreak of pneumonic plague in north and south Manchuria in the winter 1910-1911 spread over an area of about 240,000 square miles, and caused the loss of more than 40,000 lives. The Japanese spent a million and a half yen in preventive measures, consequently only 228 deaths occurred in the parts under their jurisdiction, which comprise the province of Kuantung and the districts through which the South Manchurian railway passes.

The tarabagan, *Arctomys bobac,* which inhabits the Baikal Mountains on the north of Manchuria, is liable to plague epizootics according to the investigations of Zabolotony: its fur is in great request. On the approach of winter the men employed in hunting these animals were proceeding south from the most northerly situated station on the S. Manchurian railway, Changchun, at the rate of nearly a thousand a day. Besides these there was a number nearly as large of travellers on foot. Pneumonic plague broke out among these men, who scattered the infection broadcast on their journey to their homes.

In the districts controlled by the Japanese the first cases of plague were discovered in a train coming from Changchun on December 31st, 1910. All the other passengers, 149 in number were at once sent back to Changchun and there isolated. The Japanese were not unprepared. They had organised all the resources at their disposal, which included civil, military, naval, and railway staff and equipment. 69 medical officers, 29 assistants, 414 police officers, and about 2,000 others were employed in the campaign against the pest.

The preventive measures comprised, inspection of all travellers by railway or other means, and their detention in isolation barracks built for the purpose, for 7 to 11 days; quarantine of, and rat destruction in, all boats and shipping entering the ports of Kuantung; house to house visitation; rat destruction,—though 169,025 rats were examined between November 1910 and December 1911 none were infected; burning of plague houses.

28 plates were exposed at distances up to 110 cm. from the faces of plague patients while they were in the act of coughing; colonies of *B. pestis* appeared on seven. Guinea pigs could not be infected in this manner. Plague bacilli in thin layers on glass were killed by direct sunlight in one hour, and in six hours if the sky was overcast. When they were placed on thick hempen sacking they resisted 14 hours sunlight and 20 hours diffused day light.

One hundred-thousandth of a loop of a culture of the Manchurian plague bacillus causes the death of the tarabagan when inoculated beneath the skin. One millionth of a loop kills rats and guinea pigs, and one thousand millionth causes a fatal infection of mice.

C. B.

UTHEMANN. **Wie begegnete des Schutzgebiet Kiautschou der andringenden Pestgefahr?** [Plague Prevention at Kiautschou.]—*Arch. f. Schiffs- u. Trop. Hyg.* 1912. Dec. Vol. 16. No. 23. pp. 790-807. With map.

The German Protectorate of Kiautschou is situated in the Province of Shantung, in which the ravages of plague caused 3,000 deaths during the epidemic of 1910-11. One third of these occurred in the port Tschifu, which has a large trade with Kiautschou. The German Protectorate, however, escaped the scourge.

In January 1911, as the epidemic spread through Shantung, watchful supervision was kept over the places of ingress into the German Protectorate. Finally all avenues were completely closed for more than a month. Inoculation was employed in about 200 instances only.

C. B.

DEUTMANN (A. A. F. M.). **De Pest in Karangloo in de maanden Mei, Juni en Juli 1911.** [Plague in Karangloo, Java, in May-July, 1911.]—*Geneesk. Tijdschr. v. Neder.-Indië.* 1912. Vol. 52. No. 4. pp. 431-511.

In this *Bulletin*, No. 2, p. 62, is a note on the outbreak of plague which occurred in Java in the year 1911. Deutmann gives details of that part of the epidemic which affected the district of Karangloo, of which he had sanitary control. This district covers an area of 396 square kilometers and contains a population of about 100,000 persons. 278 cases of plague were notified, with a death rate of 88 per cent. The origin of the outbreak was traced to the port of Soerabaya, whither plague had been conveyed through the agency of rats in January 1911. Sporadic cases occurred inland shortly afterwards, but the disease did not assume epidemic proportions until the months of May to July. 66 per cent. of the 278 attacks investigated by the author were of the bubonic type; 32 per cent. were septicaemic; and 2 per cent. were pneumonic. 62 per cent. of those affected with bubonic plague suffered from inguinal gland enlargment of both sides, except in six instances: 27 per cent. had swelling of the axillary glands; and in 14·5 per cent. the bubo was situated in the neck. 15,683 persons were inoculated with either HAFFKINE's prophylactic, or with a similar vaccine prepared by NIJILAND in the laboratory at Weltevreden. Plague attacked 64 inoculated, and 214 uninoculated people, the mortality amongst the former being 82·8 per cent., amongst the latter 89·7 per cent. ROUX and YERSIN's anti-pest serum was used therapeutically in 14 cases, of which eleven died; 20 cubic centimetres were injected subcutaneously twice or three times. The prophylactic administration was successful in the case of a mother who nursed her son stricken with pneumonic plague.

In 82 houses where plague was reported, 98 dead and 42 living rats were discovered and in 128 houses adjoining these, 66 dead rats were collected. Only three dead rats were found on searching 19 houses situated in plague-free localities.

C. B.

DE VOGEL (W. T.). **The Connection between Man and Rat in the Plague Epidemic in Malang, Java, in 1911.**—*Far Eastern Assoc. Trop. Med.: Trans. Second Biennial Congress, held at Hongkong,* 1912. pp. 147-149. With 10 plates.

At the time when the number of plague cases was at its highest, no house rats could be produced by the inhabitants. By methodical search in the houses where plague had occurred, however, rat shelters were discovered in the bamboo poles which enter into the construction of Javanese dwellings. Both living and dead rats were found in most of the plague houses. Sometimes the nests were empty, sometimes they contained the mummified remains of these rodents. A plate is given showing dead rats in their nest made in a bamboo ceiling immediately above the bed of a man who succumbed to plague. Living rats harboured the *Xenopsylla cheopis*. In Malang, the number of rats was less in plague houses than in those free from infection. The inference is clear that the number of rat-fleas without their natural host was greater in the infected dwellings. If all the rats had died of plague the fleas would forsake their dead bodies and seek refuge on man, to whom they would convey the disease. For the construction of rat-proof houses the bamboos are split, or if whole bamboos are used, the ends are sealed with cement, or are capped with metal.

C. B.

PLAGUE IN HAVANA.

VON EZDORF (R. H.). **The Occurrence of Plague in Habana and the Measures adopted for its Control and Eradication.**—*U.S. Public Health Rep.* 1912. Oct. 18. Vol. 27. No. 42. pp. 1697-1702.

Three cases of plague, resulting in two deaths, occurred in Havana, Cuba, between July and September 1912. There was increased mortality among rats at the time of the outbreak, but of 291 examined, none were found to be infected with plague. Up to the date of the report the inspection of 8,166 rats had not led to the discovery of the disease among them.

The suppression of the outbreak is attributed to the early recognition of the infection. The buildings in Havana are rat-proof to a great extent. The campaign included rendering rat-proof all houses, stores, etc., which had not been protected, the collection of garbage in rat-proof receptacles, the rapid removal of rubbish, the destruction of rats by traps and poison, and the disinfection of infected houses.

103 vessels were fumigated by burning 3 lbs. of sulphur per 1,000 cubic feet, or 4 lbs. per 1,000 cubic feet of cargo on board. The amount of sulphur to be used was rapidly calculated by allowing three pounds for each ten tons of gross tonnage. Not more than 10 lbs. of sulphur was burnt in one pot, and the fumigation was continued for 12 hours. Hawsers were freshly tarred for 4 feet, and rat-guards were applied.

Seven days quarantine was required of passengers who had been residing in the infected area.

C. B.

GUITERAS (J.). **Three Cases of Bubonic Plague in Havana.**—*Jl. Amer. Med. Assoc.* 1912. Nov. 16. Vol. 59. No. 20. pp. 1780-1784.

The author, who is Director of Health of Havana, gives a full account of the cases of plague recorded in the foregoing paper. An epizootic occurred among rats limited to three blocks of buildings close to the wharves, which were chiefly used as grain and food stores, at the beginning of June, 1912. At the end of the month this appears to have subsided, as few dead rats were found. On July 2nd a man who resided in this area died of plague, though it was not notified under that heading. Three other cases were reported from the same quarter of the city, two of which ended fatally. One of the patients who succumbed was treated on the 9th, 10th, and 13th days of the disease with antipest serum. A pustular eruption broke out on the 10th day.

The people responded with alacrity to calls made to them to remove refuse, and to render their residences and stores rat-proof. For many days the amount of sweepings and rubbish carried out to sea in lighters increased from the normal 450 tons to 2,000 tons.

Up to September 3rd, 17,974 rats had been destroyed; a premium of five cents per head being offered. 8,909 of these were examined, but none were infected.

The author has been breeding *Loemopsylla cheopis*, the common rat-flea of Havana, in his laboratory for several years. Their numbers diminish in summer. They are least numerous on rats in June.

C. B.

PNEUMONIC PLAGUE.

RAYNAUD. **Six Cas de Peste Pneumonique dans la Banlieue d'Alger.**—*Rev. d'Hyg. et de Police Sanitaire.* 1912. Aug. 20. No. 8. pp. 861-867.

In the year 1911 there was an epidemic of bubonic plague at Doukkala in the interior of Morocco, resulting in the loss of 10,000 lives. Cargoes of hides from the inland districts are embarked at the Moroccan ports and reach Algiers by sea. Ruisseau is a suburb of that city in which are located tanneries, abattoirs, and stores which are overrun by rats, among which there had been considerable mortality. In July, 1912, a boy who had been employed daily in rat-catching, succumbed to plague in its pneumonic form. His father, mother and a nurse were infected by him and died. The mother conveyed the disease to her sister, and the nurse to a friend. The onset in all was sudden and was marked by rigors, vomiting, and cough with blood-stained sputum; the signs of pneumonia were obscure until shortly before death which took place in 2 or 3 days. One of the patients who was treated by the intravenous and hypodermic injection of anti-pest serum lived some hours longer than the rest. Prophylactic administration of the same remedy did not avert the attack in two cases. In the campaign against the rats which followed, not a single one was found to be infected out of 1,610 examined. The poison "Grosboisine" was used for their extermination. Guinea pigs were placed in the house where the plague appeared, but they remained healthy.

The author refers to a family epidemic of pneumonic plague which occurred in 1903. A girl contracted the malady while working at a mill in Algiers, and carried it to her home where her father and mother also fell victims to it.

C. B.

Rau. **Eine Lungenpestepidemie in Südbrasilien (in Santa Maria, Rio Grande do Sul.)**—*Deut. Med. Wochenschr.* 1912. Dec. 5. Vol. 38. No. 49. pp. 2314-2315.

Sporadic cases of bubonic plague have occurred at Santa Maria for four years. The infection was brought from India to the ports Rio Grande and Alegre, thence it spread up country, to Santa Maria, a town of about 18,000 inhabitants. Plague never assumed epidemic proportions in that town, and was preceded by mortality among rats. Suddenly the type changed from the bubonic to the pneumonic form. At the end of July, 1912, one of the occupants of an insanitary bake-house, where 200 dead rats were found, was attacked with pneumonic plague and died. 17 persons, either directly or indirectly, contracted the disease from him and succumbed in two to five days. Buboes were noted in only one case, in which the cervical glands were affected and melaena was present, in addition to the pneumonic signs. Shortly after death patches of post-mortem staining appeared in most instances. Yersin's serum was given therapeutically without success, and was also employed prophylactically. Isolation of the sick in a special hospital; 10 days quarantine of contacts; disinfection of dwellings, bedding, and clothing by formalin, creolin, or carbolic acid; the use of insect powder; and a rat campaign, were the preventive measures adopted. The attendants on the patients protected themselves effectually by wearing masks.

C. B.

ABDOMINAL PLAGUE.

Knowles (R.). **A Case of Plague.—Abdominal Type.**—*Indian Med. Gaz.* 1912. Dec. Vol. 47. No. 12. pp. 478-479.

A boy died of bubonic plague in Jhansi in December 1911, when it was raging in that city. His sister, aged 8, was seized with fever, vomiting, and diarrhoea a day later, to which she succumbed in five days' time. At the post-mortem examination there was no bubo externally, but the mesenteric glands were enlarged and haemorrhagic. The spleen was engorged. "The whole of the small intestine—but particularly its caecal end showed longitudinal ulcers. The sites of these were visible from the peritoneal aspect owing to their haemorrhagic character. The ulcers were large, shallow, with soft swollen edges, haemorrhagic bases and situated in the long axis of the feet [sic]. The contents of the small intestine—some blood and much mucus—resembled red currant jelly." Bacilli which resembled *B. pestis* morphologically were found with other bacteria in the mesenteric glands and in the spleen.

[As there is no record of a cultural examination, the diagnosis of plague is doubtful.]

C. B.

TREATMENT.

AUMANN. **Beobachtungen nach Salvarsaninjektion bei einem Fall von menschlicher Bubonenpest.** [Salvarsan in the Treatment of Plague.]—*Deut. Med. Wochenschr.* 1912. Nov. 14. Vol. 38. No. 46. pp. 2166-2168.

A case of plague was removed from a steamer and was treated in Hamburg. 0·3 gm. of salvarsan was administered intravenously. Death occurred eleven days later from a secondary staphylococcic infection. The remedy appeared to increase the agglutinins in the blood, but had no favourable influence on the course of the infection.

C. B.

ROEHR (C. G.). **The Surgical Treatment of Pest Bubo. How to Reduce the High Death Rate.**—*New York Med. Jl.* 1912. Oct. 19. Vol. 96. No. 16. pp. 800-801.

It is suggested that 2 per cent. formalin should be injected into plague buboes. The author records no cases treated in this way, but he has adopted the method for tubercular glands. The introduction of the formalin causes intense pain which is followed by anaesthesia in the course of a few minutes.

C. B.

SERUMS AND VACCINES.

DARLING (S. T.). **Two Cases of Anaphylactic Serum Disease over Six Years after the Primary Injection of Horse-serum (Yersin's Anti-pest Serum).**—*Arch. Internal Med.* 1912. Nov. 15. Vol. 10. No. 5. pp. 440-444.

A pathologist received a prophylactic injection of 10 cc. of YERSIN's anti-plague serum in the year 1905 after performing an autopsy on a case of plague. Six years and four months later another similar dose was administered for the same reason. On the sixth day severe symptoms came on, great depression, syncope, feeling of utter prostration, difficulty in swallowing, ashy pallor, imperceptible pulse, yawning and sighing, and general urticaria which continued for a fortnight. It was some days before he lost his haggard look and muscular pains.

A negro who was employed as mortuary attendant developed similar symptoms eight days after a second injection of anti-pest serum, the first dose having been given six years and four months before; he recovered more rapidly than the former patient. Fourteen others to whom prophylactic injections were given on the same day remained free from all troubles, but they had not been treated with horse serum at any time previously.

C. B.

de Jonge (G. W. Kiewiet). **Het oordeel van Dr. de Raadt over het Pestvaccin.** [Dr. Raadt's Opinion of Inoculation against Plague.]—*Geneesk. Tijdschr. v. Neder.-Indie.* 1912. Vol. 52. No. 5. pp. 517-525.

In No. 2 of the above named journal de Raadt contributes a paper on the results of inoculation in the epidemic of plague which prevailed in Java in 1911. (See this *Bulletin*, No. 2, p. 62.) He gave the following table.

		Attacks of plague.	Incidence per cent.
Number of uninoculated ...	101,875	879	0·86
Number of inoculated with Dutch vaccine	47,131	125	0·26
Number of inoculated with Haffkine's vaccine	9,595	16	0·16

Notwithstanding these favourable figures, he wrote slightingly of the influence of inoculation on plague prevention, and of the greater success obtained with Haffkine's vaccine than with the Dutch. De Jonge combats these views and states that it can be shown mathematically that the chances that the lessened incidence among the inoculated was causal and not accidental, are 18,000 billion to one.

C. B.

UNCLASSED.

Shibayama (G.). **Experiments on Prophylactic Inoculation against Experimental Plague Pneumonia in Guinea Pigs.**—*Far Eastern Assoc. Trop. Med.: Trans. Second Biennial Congress held at Hongkong,* 1912. pp. 130-147.

It is not easy to excite pneumonic plague in guinea-pigs. They possess a bunch of hair at the aperture of their nostrils which acts as a filter. Five of these animals, kept for 24 hours in the vicinity of a patient whose exhalations gave rise to a profuse growth of the *B. pestis* on agar plates when he coughed, remained healthy. Exposing them to sprays of *B. pestis* emulsions results in cervical buboes and septicaemia. When plague virus is introduced directly into the lung by inoculating through the shaven skin of the right breast of these animals, they succumb to pneumonic plague on the fourth day.

Nucleo-protein was obtained by treating plague agar cultures with 1 per cent. NaOH, precipitating with acetic acid, and collecting and drying the precipitate. Guinea-pigs were injected with 0·5-1·2 mgm. of this substance, and ten to thirty days later their immunity was tested by intrapulmonary inoculation. They all died. Killed broth cultures of *B. pestis* were little better. Only one animal survived out of ten which had been vaccinated, and 12-50 days later were submitted to the test of lung inoculation. 18 mgm. of a killed agar culture protected 2 out of 10 guinea-pigs from the effects of intrapulmonary injection of the plague bacillus. Twenty out of thirty-one guinea-pigs survived lung inoculation given 12-47 days after they had been vaccinated with a living attenuated culture of the *B. pestis*. Ten guinea-pigs were vaccinated with killed agar plague emulsion, and nine days later with living avirulent plague bacilli. When their immunity was tested by lung inoculation 12-24 days afterwards, five survived. Twenty guinea-pigs were prepared in a similar manner, except that they received in addition injections of anti-pest serum; fifteen lived, their immunity being proved 11-73 days later.

The author gives this summary of his experiments:—

> Killed plague bacilli may confer a certain degree of prophylactic power on animals, but not so high as the living attenuated bacilli. This fact has been affirmed by KOLLE and STRONG in their subcutaneous inoculation tests. Nucleo-protein seems to confer little immunity, if any. Inoculation with living attenuated bacilli may incur inoculation losses, and therefore one of the following methods is proposed in practice: to inoculate with the living attenuated plague bacilli after conferring some degree of immunity by inoculation with killed bacilli from agar cultures, or to inoculate with a mixture of the living avirulent strain and anti-plague serum.
>
> The highest degree of immunity can be conferred by the last procedure.

C. B.

BROOKS (Ralph St. John). **The Opsonic Index in Plague Vaccination.**—*Brit. Med. Jl.* 1912. Oct. 26. pp. 1098-1099.

Plague bacilli contain about 1/10 their weight of nucleo-protein. Groups of rats, ten in each, were inoculated with 1/10 mg. of plague bacilli, repeated 35 days later; with 1 mg. nucleo-protein; with 1/10; 1/100; 1/12,000 mg. nucleo-protein; with 1/10 mg. nucleo-protein hydrolysing for 8 months; and with 9/10 mg. washed bacilli respectively. The serum of each series was pooled and the opsonic index determined. The smallest response was elicited by the smallest dose of nucleo-protein, and the largest by the double dose of bacilli. The opsonic curve began to rise 10 hours after inoculation, and attained its maximum on the second to the fourth day. At the end of a week it fell, but had not quite sunk to its normal level in three weeks. The injection of washed bacilli and of hydrolysed nucleo-protein caused no elaboration of opsonins in rats. Nevertheless 1/10 mg. of hydrolysed nucleo-protein, which corresponds with that contained in 1 cc. of HAFFKINE's prophylactic, caused the appearance of opsonins in the serum of eleven persons into whom it was injected. In them the maximum response was observed later than in the rats. The curve was at its highest on the fifth and sixth days. The response was somewhat greater in six who had been inoculated with HAFFKINE's vaccine on a previous occasion. The author's conclusions are as follows:—

"1. The substance which produces a rise in the opsonic index in immune pest serum is the nucleo-protein contained in the bodies of the bacilli.

"2. The washed bodies of the bacilli when used as a vaccine do not cause any increase in the opsonic index.

"3. Within limits, the larger the dose the greater the opsonic reponse.

"4. A repeated dose of vaccine raises the index above the maximum of the first inoculation, even after the curve has fallen to its normal level.

"5. In the early stages, in rats, the opsonic response and the degree of protection aroused rise together.

"6. In human beings the maximum response is observed to be much later than in the case of laboratory rats, and the response in a series of previously sensitised persons is somewhat greater than in a series of persons not previously vaccinated.

"7. The local and constitutional effects of nucleo-protein vaccination compare very favourably with those observed in other methods of protective inoculation."

C. B.

MANAUD (A.). **Les Facteurs Métérologiques et Climatologiques dans l'Etiologie de la Peste.**—*Revue d'Hyg. et de Police Sanit.* 1912. Nov. 20. No. 11. pp. 1125-1157.

A study of the seasonal prevalence of bubonic plague from the fourteenth century onwards shows that it is essentially a disease of summer and autumn in temperate climates. In support of this view the author quotes references to the bubonic plague outbreaks in Italy and France in the 14th century; to those in Milan in 1630; in Moscow in 1771; in London in 1578, 1593, 1613, 1603, 1625, 1636, and 1665; in Vienna in 1679; in Gratz in 1680; in Dantzig in 1709; in Moscow in 1711; in Marseilles in 1720; in Odessa in 1812; in Eastern Mongolia in 1898; in Oporto in 1899; and in San Francisco in 1907.

In hot climates bubonic plague prevails at that time of the year when the temperature ranges between 10° and 30° C. Temperatures below 10° C. and above 30° C. are inimical to its spread. In Bombay the epidemic is at its maximum in March, and at its minimum in July. In Egypt outbreaks of bubonic plague occur in the period November to June; the cases are most numerous in March or April. In the epidemics which took place in Aden in the years 1904 and 1905, and in that at Jedda in 1907, February and March were the months of maximum incidence. In Siam the author observed that February was the month of greatest prevalence in the outbreak of the year 1909, which comprised 191 attacks. Therefore the seasonal spread of bubonic plague is similar in all tropical climates, and it is not greatly influenced by the presence or absence of the rains.

It is a fact of familiar observation that rat-fleas are more numerous in the summer than in the winter in temperate climates. They become less lively, and their reproduction ceases in cold weather. Thus an explanation is afforded of the greater incidence of plague during the summer in temperate zones. In tropical regions temperatures above 30° C. not only cause a reduction in the number of the fleas per rat, but are also hostile to the survival of *B. pestis* in the flea's stomach: hence bubonic epidemics subside during the hottest months in the tropics.

Pneumonic plague outbreaks arise in the winter; thus in the year 1348 pneumonic plague raged in Avignon from January to March; in Poland in January 1349, where it was followed by the bubonic form in the summer of that year; in the Tyrol, Hungary, Russia, Norway, and England in the winter months of the years 1348-1352; in Wetlianka, Astrachan, from October, 1878 to April, 1879; and in Manchuria during the winter 1910-1911. Insects are not concerned in the transmission of pneumonic plague. Infection is conveyed from man to man in droplets of saliva and sputum. [This paper forms a valuable contribution to the history of plague.]

C. B.

LIST OF REFERENCES.

Compiled by R. L. Sheppard, Librarian of the Bureau.

The references are to papers published since July 1, 1912, except in the case of the Kala Azar Section, where, to secure continuity with the lists in the *Kala Azar Bulletins*, some earlier references are given. Only titles which have been verified from the original papers are included. A few medical journals were not accessible, so that there are some omissions. Titles omitted from the present list will, as far as possible, be inserted in future lists. The Lists of References will be continued quarterly.

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See also **Dysentery (B. Unclassed).**

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TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. I.] 1913. [No. 7.

KALA AZAR.

INDIAN KALA AZAR.

Eightieth Annual Meeting of the British Medical Association. Held in Liverpool, July 19th-26th, 1912. Section of Tropical Medicine —Papers dealing with Leishmaniasis.—*Brit. Med. Jl.* 1912. Nov. 2. pp. 1194-1199.

1. In a paper entitled "The Kala Azar Problem" PATTON emphasises many of the points which have been more fully discussed by him in a publication already reviewed. (See this *Bulletin* No. 1, pp. 1-3.)

2. "Some Experimental Facts re Kala Azar (Indian)" is the title of a paper by ROW, which is a preliminary note to the papers by the same author reviewed below.

3. In a paper on "Some Insect Flagellates and the Problem of the Transmission of Leishmania" FANTHAM points out how the occurrence of natural flagellates in the gut of various insects which have been supposed to be possible transmitters of leishmania may give rise to errors in experimental work. *Pulex irritans* has been shown by PORTER to harbour *Crithidia pulicis*, *Ctenocephalus canis* harbours a herpetomonas for which the writer proposes the name *Herpetomonas ctenocephali*, and PATTON has recorded a herpetomonas in *Ctenocephalus felis*. The author has recorded *Herpetomonas pediculi* from *Pediculus vestimenti* and has found a similar flagellate in *Pediculus capitis*. In mosquitoes *Herpetomonas culicis* was recorded by NOVY, PATTON and others from *Culex pipiens* and *Culex fatigans* both in the larval and adult stages. *Crithidia fasciculata* (Leger) occurs in various species of Anopheles and WENYON has recorded a Herpetomonas from the larva of *Stegomyia fasciata*. Phlebotomus, which has been suspected to be a transmitter of oriental sore, was shown by WENYON to harbour a natural herpetomonas, while house flies are commonly infected with *Herpetomonas muscae domesticae*. All these flagellates pass through leishmania-like stages and confusion of these with true leishmania can readily arise. The well known fact that bed bugs have never yet been shown to harbour a natural flagellate is emphasised.

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In the discussion on the subject of leishmaniasis H. **Seidelin** mentioned the occurrence of dermal leishmaniasis in Yucatan (see this *Bulletin* No. 1, p. 13). **Madden** made some remarks on specimens of leishmania which he was demonstrating from a disease in Egypt, which he had been accustomed to call papilliferous degeneration of the skin. The disease was fully described by **Ferguson** and **Richards**, who discovered *Leishmania tropica* in the lesions, in a paper in the *Annals of Tropical Medicine & Parasitology*, 1910. July, Vol. 4. No. 2, under the name of parasitic granuloma (see *Kala Azar Bulletin* No. 1, p. 60). **Balfour** stated that he had examined a considerable number of bed bugs (*Cimex lectularius*) in Khartoum without finding any evidence of flagellate infection. He pointed out the danger of confusing mere cultural changes in the insect's intestine with a true developmental cycle and finally referred to the observation made by **Archibald** that the dark field method demonstrated that granule shedding occurred in the flagellate cultural forms of *Leishmania tropica* and that in this fact there might lie hidden the solution of the problem of transmission of leishmaniasis.

Bayon gave a demonstration of specimens relating to the transmission of artificial cultures of *Leishmania infantum* to rats and mice. He had failed to produce a general infection in these animals by intraperitoneal injection of the cultures and was able to confirm the observation of **Delanoë** and **Visentini** that the parasites were taken up and destroyed by the mononuclear cells. A culture was obtained from the peritoneal fluid of one mouse killed four hours after injection.

C. M. Wenyon.

Row (R.). Some Experimental Facts *re* Kala Azar (Indian).—*Jl. Trop. Med. & Hyg.* 1912. Nov. 1. Vol. 15. No. 21. pp. 327-328; and 1913. Jan. 1. Vol. 16. No. 1. pp. 1-2.

These two papers contain accounts of experiments on the production of local lesions in animals with the virus of Indian kala azar. In the first place two monkeys (*Macacus sinicus*) were inoculated on each side of the forehead, one by rubbing virus from a human spleen, containing *Leishmania donovani*, into the scarified skin, and the other by injecting subcutaneously (0·3 cc. on one side and 0·15 cc. on the other) liquid from a fifth subculture on NNN medium of the leishmania from the same spleen. In the first monkey inoculated with the virus direct from the spleen on March 16, a small nodule had developed on the left side by May 22nd and by June 6th two similar nodules had developed on the right side. In all of these leishmania were found and material from one of the nodules produced a similar nodule when inoculated into another monkey. These nodules were histologically of the nature of young fibromata which ultimately absorbed leading to no generalised infection. The monkey inoculated from the culture of the leishmania on February 2nd was found to have developed a nodule on each side of the forehead at the site of inoculation on July 2nd. The nodules were freely movable under the skin and contained leishmania. One of the nodules was excised a fortnight after its appearance and half of it was ground up with 1 c.cm. of ·6 per cent. saline solution. The remaining nodule increased in size for two months, then began to dwindle, and finally disappeared about four months after its first appearance. The monkey remained quite well and showed no sign of general infection. The saline emulsion obtained from the crushed nodule was injected intraperitoneally into two mice and one *Macacus sinicus*. All these animals developed generalised leishmaniasis with numbers of leishmania in the internal organs. One other mouse injected with some of the juice expressed from the nodule also developed a general infection. The material obtained from the organs of the mice was injected intraperitoneally into six other mice; these however did not become infected, though the material injected contained many more parasites than that obtained originally by crushing the excised nodule from the monkey. The infected monkey was found to have parasites in its liver five months after injection, while the mice became generally infected in about six weeks. It appears that the virus loses its virulence for mice on passing through mice. The production of a local lesion by the injection of *L. donovani* or its culture, and the further production of a general infection in animals by injection of parasites from the local lesion, is of the utmost interest from the point of view of the relation of the two diseases, oriental sore and kala azar. The nodules which developed at the site of inoculation were rather of the nature of fibromata than the papules characteristic of oriental sore. In this connection it is of interest to remember that VOLPINO produced a local lesion containing leishmania in the cornea of a rabbit, by scarification and application of material from the spleen of a dog infected with kala azar (see *Kala Azar Bulletin* No. 1, p. 7).

C. M. W.

MEDITERRANEAN KALA AZAR.

LAVERAN (A.). **Infections des Souris et des Rats dues au Kala-Azar Méditérranéen et au Kala-Azar Indien.**—*Bull. Soc. Path. Exot.* 1912. Nov. Vol. 5. No. 9. pp. 715-721.

In this paper the author records experiments conducted with the virus of Tunisian kala azar. In an earlier paper he has shown that a general infection can be produced in mice by intraperitoneal injection of material from the spleen of infected dogs. Similarly W. L. and N. K. YAKIMOFF have infected mice by injecting cultures intravenously into the caudal vein and also by intraperitoneal injection of virus from an infected animal. The author now reports that in 26 mice injected intraperitoneally with material from the spleen, liver, or bone marrow of infected dogs or mice the following results were noted.—There was a general infection heavy in four, moderate in four, and slight in thirteen, while five showed parasites only in the peritoneal exudate which results from the inoculation. Two of these mice with general infection were heavily infected when killed, 24 and 31 days after inoculation; one was heavily infected when killed 138 days after inoculation, but the author remarks that the long duration of the infection is exceptional; other mice killed, from 127 to 203 days after inoculation, showed only a scanty infection. One mouse died with a general infection, but though no other cause than the leishmania infection could be found to account for its death the author hesitates to attribute it to this, since other mice much more heavily infected recovered.

Infection is best produced by the intraperitoneal injection of material from infected organs of another animal. Parasites can be recovered from the peritoneal exudate after eight days. They are included in mononuclear cells as a rule, but are sometimes free. Attention is called to the fact that intraperitoneal injection of cultures does not produce an infection owing to the fact that the flagellate forms are quickly ingested and destroyed by the leucocytes. Once a slight infection was produced by injecting a culture into the liver of a mouse.

The author hoped that when once a general infection had been produced in mice it would be possible to increase the virulence of the leishmania for mice by subinoculations. The contrary has proved to be the case, for the strain tends to lose its virulence in the subinoculations in mice, just as the author has found to be the case with dogs.

Enlargement of the spleen is a constant feature of infection. Of 24 mice infected, in five the spleen was very large (five to six times its normal volume which is usually 7-8 cg. for a mouse of 20 g.), in ten it was three to four times its normal volume, while in nine it was one and a half to two and a half times the normal. In one mouse the weight of the spleen was 45 cg. while in several it was 25-30 cg. Parasites were found nineteen times in the spleen, ten times in the liver and five times in the bone marrow. The spleen is thus most usually infected.

A rat inoculated intraperitoneally with virus from an infected animal died twelve days later from diarrhoea. It was found to have numerous leishmania in the peritoneal exudate and a scanty infection of the spleen which was hypertrophied. W. L. and N. K. YAKIMOFF have recorded the infection of a rat but in their case the parasites were only recovered by culture on NNN medium.

In discussing his results the author records a communication he has received from Row on the subject of his inoculations of *Leishmania donovani* (see Row's paper above). PATTON's successful inoculation of a rat with the Indian kala azar virus is mentioned and though the Indian virus appears to be more virulent for these animals than the Mediterranean the author sees in these results an indication of the identity of the Eastern and Western diseases.

C. M. W.

VISENTINI (Arrigo). **On the Morphology of the Leishmania of Italian Kala Azar. Third Communication: Cytological Researches on Leishmania in Cultures.**—*Quart. Jl. Micros. Sci.* 1912. Dec. Vol. 58. No. 2. (New Series No. 230.) pp. 353-371. With 2 plates.

The paper describes the flagellate forms of leishmania when these are fixed and prepared by methods more rational than smearing and drying in films. The medium used for culture was the well known NNN medium prepared in the usual way.

The method of abstracting the blood from the rabbit is one which has given good quantities, an important matter from the point of view of economy. The anaesthetised animal is fixed on its back with the throat exposed. After shaving and sterilising the skin, the trachea is laid bare by a median incision, the carotid is isolated from the nerves and tied as near the skull as possible. The thyroid artery is isolated and tied near the carotid in order that it may serve as a handle for holding the carotid in position. A sterile flask containing beads is held near the wound, the carotid is divided near the cranial ligature and by means of forceps holding the thyroid artery the jet of blood is directed into the flask. In this way as much as 55-60 cc. of blood can be collected and if the carotid is quickly tied and the wound sutured the animal may recover.

As regards the structure of the flagellates in these cultures it is found that the trophonucleus is of the vesicular type. There is a nuclear membrane enclosing a clear space at the centre of which is a karyosome, within which a small granule, the centriole, may sometimes be distinguished. The karyosome is sometimes seen to be connected with the nuclear membrane by fine radiating threads and very fine granules may occur on the inner surface of the nuclear membrane. The kinetonucleus is described as having essentially the same structure, with the exception that the karyosome is transversely elongated. At the anterior part of the clear area surrounding the kinetonuclear karyosome is the basal granule from which the rhizoplast of the flagellum springs. In other cases the author describes the flagellar rhizoplast as uniting directly with the karyosome, in which case it is assumed that the basal granule is within the karyosome as the centriole was within the karyosome of the trophonucleus. In nuclear division the centriole divides and with it the karyosome. The two halves of the centriole may remain connected for some time by a centrodesmose. The nuclear membrane persists during this division. The author speaks of the splitting of the flagellum into two, one of full length and the other shorter. Later the shorter one approximates in length to the other. [The figures however do not show this splitting and are rather illustrations of the view that the new flagellum is an entirely new formation formed as an outgrowth of the divided basal granule. This paper is a confirmation in nearly every detail of the description given previously by WENYON of the structure of the cultural forms of *Leishmania tropica* from Bagdad.]

C. M. W.

SPAGNOLIO (G.) **Leishmaniosi Interna (Kala Azar) a Messina.—Nuovi Esempi Clinici e Sguardo Riassuntivo.** [Leishmaniasis (Kala Azar) in Messina. A Resumé of the Clinical Features of some New Cases].—*Malaria e Malat. d. Paesi Caldi.* 1912. Nov. Vol. 3. No. 11. pp. 307-310.

It is pointed out that the view expressed by FELETTI and GABBI that kala azar was a widespread disease in Sicily is amply justified. JEMMA has in little more than two years diagnosed by spleen puncture 66 cases, LONGO 45 cases, and FELETTI, PULVIRENTI, LICCIARDI a still greater number. During this year the author himself has definitely diagnosed a further fifteen cases in all of which leishmania were discovered. A short review of each of these cases is given.

In the majority of cases it is stated that dogs were not kept in the houses from which they came. In two a culture of the leishmania was obtained by ROGERS' method in citrated blood. In one instance it was found that the mother of the child had died shortly before from a malady which the author feels sure was kala azar. If this be so it is another instance of the disease occurring in an adult.

C. M. W.

DI CRISTINA (G.). **I Corpi di Leishman nell 'Organismo infettovanno incontro a Processi Litici? (Nota Preventiva.)** [Disappearance of Leishman's Bodies from an Infected Organ after Death.]—*Pathologica.* 1912. Nov. 1. Vol. 4. No. 96. pp. 643-645.

The author describes a case of infantile kala azar in a child of ten months. Numerous parasites were discovered by spleen puncture. About fifteen days later the child died and, though an autopsy was performed two hours after death, no typical leishmania were to be found in smears of the spleen, liver, or bone marrow, stained by Leishman's modification of the Romanowsky stain. In sections of the liver, however, a few cells containing parasites were made out. The author believes that the parasites were destroyed shortly before death owing to the appearance in the blood of some anti-leishmania substance. A somewhat similar case in which numerous leishmania were found in the spleen before death and none after was noted by LIGNOS (see this *Bulletin* No. 1, p. 4).

C. M. W.

LONGO (A.). **Tentativi Immunodiagnostici ed Immunoterapeutici nella Leishmaniosi Infantile.** [Attempts at Serum Diagnosis and Immunisation in Infantile Leishmaniasis.]—*Policlinico.* Sez. medica. 1912. Oct. Vol. 19. No. 10. pp. 446-452.

In these investigations the blood of three children, in what the author calls the second stage of kala azar, was used. As controls he employed the blood of a healthy adult, a child suffering from infantile paralysis and another from vulvo-vaginitis. The agglutinating power of the blood in various dilutions was tested against cultures of leishmania. None of the cases showed any agglutination power. LEVADITI and MUTERMILCH showed that the serum of guinea-pigs infected with various trypanosomes, when mixed with trypanosomes and leucocytes from either a healthy or infected guinea-pig, caused the leucocytes to attack and eventually ingest the trypanosomes. Tested with cultures of leishmania the serum of the kala azar cases had no such action. No evidence could be obtained that either precipitins or specific amboceptors existed in the blood of the kala azar cases. Two cases were treated with injections of killed cultures, but this was not attended with any good result, nor did antibodies appear in the blood.

C. M. W.

Caronia (G.). **Tentativi d'Immunizzazione attiva per la Leishmaniosi Umana nel Bambino Sano.** [Attempts at Active Immunisation in the Healthy Child by Human Leishmaniasis.]—*Pathologica.* 1912. Dec. 1. Vol. 4. No. 98. pp. 724-725.

This paper appears to be a further illustration of results obtained by the author in co-operation with di Cristina (see this *Bullètin* No. 1, p. 7). In the present instance, a healthy child two years of age, whose blood did not agglutinate cultural forms of leishmania and gave a negative reaction to complement deviation, was injected daily for five days with 1 cc. of inactivated culture of leishmania. The reactions were again tested, with negative result, while the condition of the blood cells remained unchanged. The treatment was repeated for a further six days after which both in the case of agglutination and complement deviation a positive result was obtained. The leishmania thus agree with other pathogenic organisms in stimulating the production of antibodies.

C. M. W.

Massaglia (A.). **Contributo allo Studio delle Infezioni da *Leishmania infantum*. Nota Preventiva.** [A Study of the Infection due to *Leishmania infantum*.]—*Pathologica.* 1912. June 1. Vol. 4. No. 86. pp. 308-310.

A dog was inoculated from a case of kala azar in a child on December 7th, 1907. After the virus had passed through two dogs a bitch was inoculated on July 20th, 1909. It was found by Nicolle in June 1910 to be infected. Two small dogs (age about three months) were placed in the kennel with this dog, which was subjected to splenectomy on July 29th, 1910. The dog recovered from the operation and lived with the two small dogs until May 1911, when all three were killed, and were found to be uninfected, though the spleen of the oldest dog was infected when removed at the operation.

C. M. W.

Cannata (S.). **Quarta Serie di Ricerche Ematologiche nell' Anemia da Leishmania.** [Fourth Series of Haematological Researches on Leishmanial Anaemia.]—*La Pediatria.* 1912. No. 8.

In this paper the author gives an account of blood examinations made on 24 cases of infantile kala azar, which, with the cases previously examined by him (*Kala Azar Bulletin* No. 2, p. 81), bring the total up to 56. As was reported in his earlier papers the author still finds that blood examinations in this disease cannot be considered of absolute importance as an aid to diagnosis. Of the 56 cases 58·9 per cent. showed leucopenia, in 30·4 per cent. the leucocytes were normal in number or only slightly reduced, while in 10·7 per cent. there was a leucocytosis. Of the leucocytes the lymphocytes were most numerous. In this paper as in the earlier ones a table is given showing the results of the blood examinations.

C. M. W.

SPAGNOLIO (G.). **Sulla Coltivabilità della Leishmania, così detta Infantum, nel Sangue Splenico Citratato o Mezzo di Rogers.** [On the Cultivability of the so-called *Leishmania infantum* in Citrated Splenic Blood after the Method of Rogers.]—*Malaria e Malat. d. Paesi Caldi.* 1913. Vol. 4. No. 1. pp. 2-7.

Owing to the fact that the possibility of cultivating the parasite of Mediterranean kala azar after ROGERS' original method has been disputed by some observers the author has again undertaken to settle this question. He points out that the parasite of Indian kala azar does not always develop into flagellates in citrate solution and this is probably also true of the Mediterranean form. Culture was attempted in six cases. In two cases in which the product from spleen puncture was added to ten per cent. citrate solution and incubated at 30° C. a negative result was obtained. In another case ten per cent. citrate solution in ·75 per cent. sodium chloride solution was used, also with a negative result, while the employment of a two per cent. citrate in ·5 per cent. sodium chloride solution showed flagellates in 48 hours. In the fourth and fifth cases also the latter solution gave a positive result. In the sixth case the blood from the spleen was drawn up into the syringe containing half a cubic centimeter of ten per cent. sodium citrate solution. Part of the mixture in the syringe was then added to 3 cc. of a two per cent. citrate solution in ·8 per cent. saline, contained in a test tube. The tube and syringe were incubated at 30° C. After 48 hours flagellates had developed both in the tube and in the syringe. These experiments clearly establish the claim of JEMMA and LONGO to have observed the development of flagellates in citrate solution, to which leishmania from infected spleens of children, suffering from infantile kala azar, had been added, and show that as regards culture the parasites of the Mediterranean and Indian diseases do not differ from one another.

C. M. W.

SCORDO (Fr.). **I Leucociti della Cavia e del Coniglio in contatto delle Forme Flagellate della *Leishmania Donovani* "in vitro" e nel Corpo degli Animali.** [Leucocytes of the Guinea Pig and Rabbit in contact with the Flagellate Forms of *Leishmania donovani* in vitro and in the Animal Body.]—*Malaria e Malat. d. Paesi Caldi.* 1912. Sept.-Oct. Vol. 3. Nos. 9-10. pp. 246-249. With 1 plate.

This paper is a record of experiments on the behaviour of cultural forms of leishmania when left in contact with leucocytes obtained from artificially produced exudate from the pleura of guinea pigs or the peritoneum of rabbits. VISENTINI (see this *Bulletin* No. 1, p. 9) has shown that the flagellate forms are quickly ingested and destroyed by the leucocytes in the peritoneal cavity of guinea pigs. The author of this paper has obtained similar results but he has found that when left in contact with leucocytes *in vitro* instead of in the peritoneal cavity, digestion does not proceed so rapidly. Ingested forms are still recognisable after a period of 24 hours, whereas two hours is sufficient for their destruction by the leucocytes when in the peritoneal cavity.

C. M. W.

NICOLLE (C.) & BLAIZOT (L.). **Virulence des Cultures de** *Leishmania infantum.* **Sensibilité du Chacal au Virus du Kala Azar Tunisien.** *Bull. Soc. Path. Exot.* 1912. Nov. Vol. 5. No. 9. pp. 721-723.

Four young rabbits and four young guinea pigs were inoculated intravenously with cultures of leishmania from a case of infantile kala azar. Two young dogs and a kitten were similarly inoculated, and one dog intraperitoneally. Of all these animals only one of the young dogs intravenously inoculated became infected. The animal was killed on the 72nd day and from its organs another dog and two jackals were inoculated intraperitoneally. The dog and one of the jackals became infected. The jackal was apparently in good condition but was found infected when killed on the 84th day of experiment. The parasites were most numerous in its bone marrow but the liver and spleen were also infected.

C. M. W.

GABBI (U.). (i.) **Sulla Identità delle** *Leishmanie infantum* **e** *Donovani.* (ii.) **Il Kala-Azar infantile e la** *Leishmania infantum* **al Lume delle Ultime Ricerche.** [On the Identity of *Leishmania infantum* and *L. donovani.*]—*Malaria e Malat. d. Paesi Caldi.* 1912. Dec. Vol. 3. No. 12. pp. 334-335 and 336-347.

The two papers here reviewed occupy ten pages. They consist of a summary of recent work on kala azar with a view to proving the identity of the various forms of the disease met with in different parts of the world. The author is convinced that the kala azar of India, the Mediterranean, the Sudan, China and other countries is always the same disease and that *Leishmania infantum* as the name of a distinct species lapses in favour of *Leishmania donovani.*

C. M. W.

MARZINOWSKY (E. I.). **Maladies Voisines de la Malaria en Russie, Kala-azar, Fièvre de Malte, etc.**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 868-875.

It is pointed out that in the south and south-east of Russia a febrile form of splenomegaly exists, in which malarial parasites cannot be found. These cases are probably kala azar and the author mentions the cases of this disease already described from Russia. The first was described by himself, the second by NIKAFOROFF, the third by KALATCHNIKOFF and the fourth by PETRONE. Four further unpublished cases were seen by GOURKO in Tiflis. To these must be added the case described by SLUKA and LARFLE from Taschkent. Details of the author's case are given and he draws attention to the occurrence of canine leishmaniasis in Transcaucasia as demonstrated by DJOUNKOWSKY (*Kala Azar Bulletin* No. 1, p. 16).

C. M. W.

TRANSMISSION.

WENYON (C. M.). **Experiments on the Behaviour of Leishmania and Allied Flagellates in Bugs and Fleas, with some Remarks on Previous Work.**—*Jl. London School Trop. Med.* 1912. Dec. Vol. 2. Part 1. pp. 13-26.

The first part of this paper contains a criticism of the view of PATTON that the bed bug is the true host of leishmania. It is pointed out that many organisms survive for a considerable time in the gut of the bug. The spirochaete of relapsing fever may be found three weeks after ingestion; *Schizotrypanum cruzi* will develop in the bug and be still infective to small animals after ten days; *Trypanosoma lewisi* will develop in the bug and on the eleventh day after ingestion crithidial, herpetomonad, and leishmanial forms can be found; and *Trypanosoma rhodesiense* persists for seven days or longer. This being the case it is not to be wondered at that the easily cultured leishmania will survive and develop in this insect. It is pointed out that the production of flagellate forms of leishmania in the gut of the bug and the subsequent transformation of these into round post-flagellate forms, as described by PATTON, is a further illustration of the similarity of the changes undergone by the leishmania in the gut of the bug and in the culture tube; for in old cultures similar round forms are produced. The extent of infection of the bug's gut with flagellate forms depends on the number of leishmania ingested. It is argued that if the bug were the true host then the ingestion of only a few leishmania should lead ultimately to a complete infection of the gut. Further the discovery of PATTON that a second feed of blood destroys those flagellates already developed in the gut is regarded as an additional argument against the bug hypothesis, for in the case of *Trypanosoma lewisi* and *Herpetomonas* in their true host, the flea, repeated feeds of blood have no effect in reducing the infection. The author obtained some evidence that *Leishmania tropica* would develop to flagellate forms in the gut of *Stegomyia fasciata* in Bagdad. Patton concluded that the forms seen by the author in the mosquito were probably flagellates peculiar to the mosquito. It is pointed out in this paper that it was proved that the mosquitoes to the extent of ten per cent. took up leishmania when fed upon an oriental sore, and that flagellates were found in practically the same percentage when the mosquitoes were dissected at suitable intervals after feeding on the sore; on the other hand no flagellates were found in the same number of controls dissected after similar intervals after feeding upon a healthy person. This being the case, it is claimed that it is more reasonable to assume that the flagellates were developed from the leishmania than that they were peculiar to the mosquitoes. On the question of nomenclature it is pointed out that the name *Herpetomonas* is applied to flagellates peculiar to insects, while the fact that the leishmania lives and produces disease in man and animals is proof that it is fundamentally different and justifies its inclusion in a separate genus, *Leishmania.*

Experiments with the object of infecting *Cimex lectularius* with *Leishmania tropica* were undertaken. These were carried out by feeding 105 bugs (all hatched in the laboratory except 18) on a non-ulcerating oriental sore in which leishmania were numerous. The following dissections were made:—

Number of bugs fed.	Number of days between feeding and dissection.	Number of bugs giving positive results.
26	9	0
14	8	0
29	7	0
10	6	0
12	4-6	0
5	3	1
9	2	2
Total 105		3

The three bugs giving a positive result were all hatched from the egg in the laboratory and had their first feed upon the sore. All bugs were incubated at 22°-23° C. The number of flagellates in the three bugs was small and none of the bugs dissected after longer intervals were infected, as they should have been if any active multiplication was taking place.

Attempts were also made to infect fleas, both *Pulex irritans* and *Ctenocephalus canis*, by feeding them upon the sore. For convenience the fleas were fixed in small loops of fine wire as Nöller has done in his *Trypanosoma lewisi* experiments (see *Sleeping Sickness Bulletin*, Vol. 4, No. 38, p. 215). While feeding, the flea repeatedly passes faeces which, at first consisting of digested blood mixed with fresh blood, soon become pure blood. It is easy to collect the faeces on cover glasses and, should the gut be infected with flagellates, some of these will be found in the stained films. By feeding the fleas upon uninfected individuals it can be determined whether the flea is infected or not prior to experiment. It was found that the faeces passed by the flea while it was feeding upon the sore contained *Leishmania tropica*, so that there was direct proof that the flea could take up the parasites from the sore. Fleas after feeding were kept in the incubator (22°-23° C.) for varying intervals (24 hours and upwards), when they were fed again and the faeces examined. If the leishmania were undergoing a development, some of these forms should appear in the faeces. In no case however was any trace of the leishmania taken up at one feed found at the next. These experiments involved about 50 feeds upon the sore. Some of the fleas (both human and dog) which had not become infected with leishmania after repeated feeds were readily infected with *Trypanosoma lewisi*, which underwent a complete development under the same conditions of experiment. No evidence was thus obtained that *Leishmania tropica* will develop either in the dog or human flea. It was further found that both the human and dog flea might be naturally infected with a *Herpetomonas* which in many of its stages was hardly to be distinguished from developmental forms of leishmania. Accordingly the author doubts very much whether the flagellates described by Basile, Alvarez and Pereira da Silva from fleas and supposed by them to be developmental forms of leishmania are in reality such.

A *Pulex irritans* infected with *Herpetomonas* was kept alive from August 24th to November 4th, during which time it had sixteen feeds of human blood and constantly passed large numbers of *Herpetomonas*, both flagellate and non-flagellate forms, in its faeces. A culture of the organism was obtained on NNN medium and it was shown that the small cystic forms passed in the faeces can withstand drying for at least 24 hours, for a culture on NNN medium was obtained by spreading the faeces on a cover glass, drying, and after 24 hours dropping the glass into the water of condensation in a culture tube of this medium.

C. M. W.

Sergent (Edm. & Et.), l'Héritier (A.), & Lemaire (G.). **'Transmission de Leishmania de Chien à Chien par Piqûres de** *Pulex serraticeps*.—*Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 595-597.

1. A young dog in good condition which had been in the Institute for two months was found to be free from leishmania as judged by a liver puncture. Between January 9th and 18th, and February 1st and 28th, it was bitten 82 times by fleas (*Ctenocephalus canis*) for periods of one to fifteen minutes. The fleas had been kept in tubes at 22° C. and they had been fed upon a dog infected with leishmania. The fleas were kept for eight days so that they were infected with a virus from one to eight days old. The dog was kept carefully free from all ectoparasites by constant washing with disinfectants. In March and April the dog lost flesh and showed the clinical signs of infection. The examination of the bone marrow always gave a negative result. In June the dog began to improve and on June 12th was killed. The liver gave a negative result both to culture and microscopic examination. Leishmania were however found in small numbers in the spleen and bone marrow, and a culture of flagellates was obtained on NNN medium from the spleen. No culture was obtained from the bone marrow. A control dog subjected to the same treatment save for the feeding of the fleas remained healthy and gave only negative results when killed on the same day as the experimental dog.

[This positive transmission experiment by the dog flea seems practically free from possible error. It is unfortunate that even when infected the liver gave a negative result both to microscopic examination and to culture, for it was by liver puncture performed before experiment that the dog was declared to be uninfected. Liver puncture is thus unreliable as a test of infection for experimental purposes.]

2. A single flea was fed every two days upon the infected dog. After a fortnight of this feeding it was fed daily for fifteen days upon a healthy dog. There was no evidence that the dog became infected and no leishmania were obtained either by culture or examination of smears.

3. A single flea was fed once upon an infected dog. Two days later it was fed upon a healthy dog and after that daily upon the same dog for fifteen days. No infection occurred.

As regards developmental forms in the fleas the authors found that two fleas which had fed upon the infected dog contained flagellates, while of nine fleas taken from presumably healthy dogs two were found infected. It has not been shown whether the flagellates are connected with the leishmania or not.

C. M. W.

BASILE (Carlo). **Sur l'Identité des Leishmanioses et sur leur Mode de Transmission.**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 812-816.

In this paper the author records a case of kala azar in a child aged four in the vicinity of Messina, where infection appears to have been acquired from a dog which was proved by microscopical examination of its bone marrow to have the disease. No other possible origin of the infection could be found. This case is regarded as a further demonstration of the transmission of kala azar from dog to child by means of the flea. The author reminds his readers that he proved beyond doubt in his transmission experiments that fleas are the carriers of the disease, and refers to the recent experiments of SERGENT, L'HÉRITIER and LEMAIRE.

The dog which was apparently the reservoir for the leishmania in this case was found to harbour fleas and ticks. Some of these were dissected and "protozoa, type leishmania" were discovered only in the fleas. The author admits that blood-sucking insects may harbour flagellates resembling leishmania, but claims that he ventured to describe flagellates from fleas only as such, when he had proved experimentally that the flea was the true host of leishmania.

Attention is drawn to the fact that the author was the first to record, in November 1910, the possibility of a spontaneous cure resulting in cases of infantile kala azar.

C. M. W.

FRANCHINI (G.). **Leishmania et Punaises.**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 817-819.

Experiments were conducted with the object of infecting bed bugs, *Cimex lectularius*, from cultures of *Leishmania infantum*. About 300 bugs, some of which were hatched in the laboratory, were starved and allowed to feed upon rich cultures. Only in six of these was any trace of the flagellates found. In two there were definite signs of degeneration, while in four the flagellates though not degenerating were quite unchanged and showed no sign of developing. The number of flagellates in each preparation was very small, so that in a comparatively short time the vast majority of those ingested had been destroyed. The author contrasts this result with that which he has had in his mosquito experiments, where large infections were found. He considers that the gut of *Cimex lectularius* is not suitable for the development of *Leishmania infantum*.

C. M. W.

Franchini (G.). **Leishmanie e Zanzare. Ulteriori Esperienze con Zanzare o Parassiti Splenici.** [Leishmania and Mosquitoes.]—*Riforma Medica.* 1912. Dec. 7. Vol. 28. No. 49. pp. 1355-1358.

The outline of the results embodied in this paper was contained in an earlier note by the author which was reviewed in this *Bulletin* (No. 1, p. 9). The present communication contains little additional matter though the author now gives figures of the developmental forms of the leishmania in the mosquitoes. Some of these show flagellates which may very well be cultural forms of leishmania, while others show structures the nature of which it is impossible to decide. The author however believes that they have some connection with the development of the leishmania.

C. M. W.

Visentini (Arrigo). **Transmission of Leishmaniasis by means of Cultures and the Mechanism of the Natural Immunity in Rats and Guinea Pigs.**—*Quart. Jl. Micros. Sci.* 1912. Dec. Vol. 58. No. 2. (New Series. No. 230.) pp. 373-384. With 1 plate.

The author describes unsuccessful attempts to infect rats and guinea pigs by means of cultures of the leishmania of Mediterranean kala azar. He discusses the mechanism of immunity and shows that within the peritoneal cavity the cultural forms are quickly ingested and destroyed by mononuclear cells. The paper appears to be a further edition with a coloured plate of the results published by him before (see this *Bulletin* No. 1, p. 9).

C. M. W.

Tropical Sore.

La Cava (Francesco). (i) **Sulla Leishmaniosi delle Mucose e del Primo Reperto di *Leishmania Tropica* Flagellata nel Corpo Umano.** [On Leishmaniasis of the Mucosa and the First Discovery of the Flagellate Form of *Leishmania tropica* in Man.]—*Malaria e Malat. d. Paesi Caldi.* 1912. Nov. Vol. 3. No. 11. pp. 310-313.

(ii) **De la Leishmaniose des Muqueuses et de la Première Decouverte de la *Leishmania tropica* Flagellée dans le Corps Humain.**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 808-812.

The first case of oriental sore in Italy was described by Gabbi about three years ago. Since then many cases have been discovered. These have all shown the usual features of the disease. The author now brings forward two cases which show involvement of the mucous membranes of the nose and mouth and resemble in this way the form of the disease described by Splendore, Carini and others from South America. In one case (a man aged 40 from Bovalino) there was an ulcerating papule on the mucous surface of each angle of the upper lip. *Leishmania tropica* was found in these. In the second case a slight excoriation about the orifice of the right nostril was noticed. It was covered by a scab and bled readily. Extension into the nasal cavity took place and a framboesial-like condition of the septum resulted. Inside the mouth the hard and soft palate showed whitish or brownish spots, which suggested that there had been lesions resembling those of the nose, but which had already healed. The right nostril was much reduced in size by the growths and consequently there was some difficulty in nasal breathing, while the voice was changed. The patient, a woman twenty years of age, suffered from anaemia and its effects and occasional febrile attacks. Leishmania were discovered in the nasal lesions. [The author considers these cases to be analogous to those described by SPLENDORE and CARINI from South America. It must, however, be admitted that the South American cases with the extensive involvement of the nasal and buccal cavities offer a different picture to the two cases here described, with the small papules on the inner surface of the lip and the growth about the nasal orifice. The author has not shown that the markings in the mouth were connected with the disease.]

The author states that he has found beside the typical leishmania other elongate forms like those described by SPLENDORE (see this *Bulletin* No. 1, p. 12). He further claims to have found, though much more rarely, elongate flagellate forms similar to those met with in cultures. This discovery he made over a year ago but did not feel justified in recording an observation of this importance on a single case. More flagellate forms have been found in the cases which form the subject of these papers so that the author now records his observation with confidence. Apparently these flagellate forms were found within the cells.

C. M. W.

LAVERAN (A.). **Présentation de Macaques Inoculés avec Succès au Moyen d'une Culture de la *Leishmania* du Bouton de Delhi.**—*Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 573-575.

The cultures used for the inoculations were obtained from Row in India and were from a Cambay sore. Two monkeys, a *Macacus sinicus* and a *Macacus cynomolgus*, were inoculated with success. The best results were obtained by inoculating in the skin as in vaccination against small pox. One monkey developed sores on the frontal region and external surface of the thigh, and they were still developing after a period of 74 days. The other monkey similarly had three sores on the frontal region, and one on the thigh. Some of the sores were in the form of unulcerated papules, while others were ulcers covered by scabs. Leishmania were constantly present in the lesions.

The author points out that his results resemble closely those obtained by NICOLLE with North African sore, so that he regards the Indian and African diseases as identical.

A dog and several mice proved refractory to inoculations with the cultures.

C. M. W.

v. PETERSEN (O.). **Die Salvarsanbehandlung der Orientbeule (Leishmaniose).** [The Treatment of Oriental Sore by Salvarsan.] —*München. Med. Wochenschr.* 1912. Nov. 12. Vol. 59. No. 46. pp. 2491-2496.

The author points out that BOROVSKY first described the Protozoa from oriental sore in 1908, from cases of the disease in Tashkent, but that the publication was made in a Russian military journal and did not attract the attention of the outside world. The author has made a tour through south-east Russia, visiting the following places—Tashkent, Buchara, Aschabad, Kokand. In all, 120 cases of oriental sore were seen and these shared 364 sores between them. The cases conformed to the usual type of the disease. Details are given of the parts of the body infected and the ages of the individuals. Treatment was carried out on 36 cases by intravenous injections of salvarsan. There were 31 favourable results (sixteen cured, four nearly cured, and eleven much improved). Two appeared to be unaffected by the drug while the three remaining cases were not heard of after treatment. The drug was dissolved in distilled water and given in a dose of 0·4-0·6 gram for an adult. Of fifteen cases completely cured healing took place in fourteen days in six cases, in six days in three cases, in eight days in two cases, and in ten, eleven, nineteen and thirty days in four cases.

The author concludes that salvarsan in these doses is a specific against the Protozoa causing oriental sore and advises the use of this drug in its treatment on account of its rapid action. The dose may be repeated in a couple of weeks if improvement is delayed. It is likely to be of much use in the case of those in military service, where it is undesirable that long invaliding from duty should be caused by the disease.

C. M. W.

ERRATUM.

Bulletin No. 1 (November 15, 1912), p. 14, third line from end of first paragraph. For the words "Over three weeks" read "Over three months."

MALARIA.

EPIDEMIOLOGY.

CHRISTOPHERS (S. R.). **Malaria in the Andamans.**—*Scient. Memoirs by Officers of the Med. & San. Depts. Govt. India.* 1912. New Series No. 56. 48 pp. With 1 plate and 1 map. Calcutta: Superintendent Government Printing, India.

In this memoir the author gives an excellent account of malaria as it occurs in the Andaman Islands. Altogether fifteen tables are given which illustrate many interesting points, *e.g.*, spleen rate among children and adults, in the various villages. The observations recorded enable some very definite conclusions to be drawn regarding the disease in these parts.

The chief carrier in the Settlement is *Nyssomyzomyia ludlowi*, a species which breeds in and about salt swamps, and was not found at a greater distance from salt or brackish water than half a mile. The species of parasite proved to be carried by this anopheline was malignant tertian. It is probable as happens with other species that it carries all forms of the parasite. The author is doubtful whether any part is taken in the transmission of malaria by the other common species *Nsm. rossi*, and *Myzorhynchus barbirostris.*

Owing to the distribution of *Nsm. ludlowi*, malaria in the settlement is confined to a belt around the margin of the harbour, and is absent or nearly so from villages more than half a mile from the sea coast or the salt swamps associated with this. This freedom from malaria is seen even in inland villages situated on the margin of swamps, amidst rice fields and near jungle.

The endemicity even within the malaria belt is not strikingly high and only one large village (Port Mouat) showed a spleen rate of over 50 per cent. This moderate endemicity is associated with a moderate prevalence only of anopheles.

Suitable conditions for breeding of anopheles were unlimited, but fish of the genus *Haplochilus* were very common and were found in all waters except those of a very temporary nature.

The predominating type of parasite among the children in the villages was simple tertian. Among convicts admitted to hospital and among the convalescent gang quartan infection formed 50 per cent. or over. The carrier was the same, and there is little reason to doubt that the quartan parasite predominated in the case of the labouring convicts, because circumstances favoured relapses whilst actual transmission of the disease was not very active.

It is interesting to note that though infection with malignant tertian at the time of the author's visit was very little in evidence yet the only two infected anopheles encountered were infected with this type of parasite.

There is some reason to believe that proportionate prevalence of the different forms of parasites in any community is dependent upon:

(1) Activity of transmission (numbers of Anopheles carriers).

(2) Factors increasing or diminishing the number and continuance of relapses.

Malignant tertian (producing gametes) most abundantly increases whenever transmission is active, *i.e.*, the number of anopheles are high. Quartan, producing few gametes, but peculiarly prone to relapse and to remain for long periods in the blood, relatively increases when transmission is low but factors favouring relapses high. Simple tertian is an intermediate form, able to assert itself most when transmission is moderate and the antagonism to relapses not too high (native children as against well fed Europeans who suffer most from malignant tertian due to fresh infection).

It remains to be seen whether the frequency of relapses at different periods after the original infection does not differ in the case of different parasites, still further enabling us to explain the prevalence of different species under any given conditions.

The author summarises his conclusions regarding malaria among the labouring convicts. He thinks that the chronic ill health in them is due to relapses, and not as a rule to re-infection.

In conclusion certain recommendations are given regarding the prevention of malaria amongst the self supporters and free population; also amongst the labouring convicts.

In regard to the free population, a malarious village ought to be moved either at once or gradually to a malaria-free site. In the case of convicts it is advised, in some cases, to change the site of the barracks. Antimosquito campaigns might be introduced by filling up swamps close to important stations. Quinine prophylaxis is recommended.

J. G. Thomson.

Rossi (Giacomo). **Sull Rapporti fra Malaria ed Agricoltura.** [Malaria and its Relationship to Agriculture.]—*Atti d Società Italiana per il progresso delle Scienze.* IV. Riunione. Abstracted in *Policlinico.* Sez. pratica. 1912. Dec. 15. Vol. 19. No. 51. pp. 1880-1881.

The author thinks that the study of malaria and its relationship to agriculture is most incomplete. It is pointed out that malaria decreases in most cases where there is advanced cultivation of the soil. In North Italy, where cultivation is less owing to the climate and where there is an abundance of permanent irrigation, it takes a longer time to get the place healthy than in the South where cultivation is more advanced.

J. G. T.

CULTIVATION.

Thomson (John Gordon) & McLellan (S. W.), with a Note by Sir Ronald Ross. **The Cultivation of one Generation of Malarial Parasites (*Plasmodium falciparum*) in Vitro, by Bass's Method.**—*Ann. Trop. Med. & Parasit.* 1912. Dec. 30. Vol. 6. No. 4. pp. 449-459. With 2 plates.

Thomson and McLellan, working in the Royal Southern Hospital, Liverpool, have successfully grown the malarial parasite in vitro, from two patients infected with *Plasmodium falciparum.* The technique used was practically identical with that described by Bass, the only points of difference being a slight increase in the amount of dextrose employed relative to the quantity of blood. The authors, for example, used 1/10 cc. of a 50 per cent. solution of dextrose to 8 cc. of blood drawn and incubated at 38° C., while Bass used 1/10 cc. of dextrose to 10 cc. of blood and incubated at a temperature of 40° C.

The cultures were examined at intervals of twelve hours, twenty-five hours, twenty-seven hours and thirty-two hours. Smears were made in the ordinary way and stained with Giemsa or modified Romanowsky solution.

The authors describe the morphology of the parasites as seen in the culture tubes. Before inoculation the plasmodia varied in size, with a maximum diameter of about 3μ; they also varied in shape though the ring forms predominated. After twelve hours incubation, at a temperature of 38° C., a very definite increase in the size of the parasites was to be noted and these now had a maximum diameter of 5μ to 6μ. A round mass of pigment about 1μ in diameter was observed, usually situated at one pole of the parasite. The chromatin was situated in the centre, and seemed to have increased in quantity. After twenty-five hours incubation a most remarkable appearance was noted in fixed specimens prepared from two culture tubes, definite segmenting forms being seen in large numbers, showing the nucleus broken up into definite masses of chromatin, which varied from two to thirty in number. The diameter of these schizonts varied according to the amount of segmentation that had taken place, the maximum being about 7 to 8μ. The pigment mass was quite distinct and where segmentation was nearly completed the merozoites were concentrically arranged around it, thus forming the so-called "rosette."

A coloured plate is given showing the parasites before inoculation and after twelve and twenty-five hours incubation. A plate of microphotographs is added showing these characters. A noticeable feature in the cultures was the tendency of the parasites to clump together.

The authors cultivated parasites from two different patients. Several culture tubes were prepared from each. In those prepared from the second patient segmentation did not proceed so far; that is, the number of merozoites was less.

This diversity of number is capable of various explanations:—

(1) That there are two or three varieties of the malignant parasites.

(2) At the time the observations were made segmentation may have been more or less complete.

(3) The administration of quinine in the case of the second patient may have in some way lowered or modified the vitality of the parasite and thus prevented complete segmentation.

Thomson and McLellan are proceeding with these experiments with a view to elucidating several points of interest. Sir Ronald Ross adds a note to the paper; he is quite convinced that there is indisputable evidence that *Plasmodium falciparum* has been successfully cultivated up to the sporulation forms.

The authors did not succeed in cultivating a second generation.

H. B. Fantham.

OLPP (Dr.). **Die Reinkultur von Malariaplasmodien nach Bass und Johns.** [Cultivation of Malaria Plasmodia by Bass and Johns' Method.]—*Münch. Med. Wochenschr.* 1912. Nov. 26. Vol. 59. No. 48. pp. 2623-2625.

A description of the work of BASS and JOHNS (see this *Bulletin*, No. 1, pp. 22-24).

J. G. T.

SYMPTOMATOLOGY.

DAGORN & HEYMANN. **Douleurs Néuralgiques Paludéennes des Extrémités.**—*Bull. Soc. Méd. Chir. de l'Indochine.* 1912. Nov. Vol. 3. No. 9. pp. 588-593.

GRALL has pointed out that malaria may be responsible for causing certain nervous affections, *e.g.*, orbital neuralgia, facial neuralgia, intercostal neuralgia, headaches, or localised fever. These conditions are to be explained by a localised action, either of the parasites or of the toxins, on the cerebro-spinal system and the peripheral nerves.

The authors describe the case of a soldier who was seized with peculiar neuralgic pains in his extremities, burning sensation in the feet, with a slight degree of asphyxia of the extremities like that described by RAYNAUD.

The patient, aged 26, gave a history of specific disease which was treated with mercury and "606" injection. During a march he was seized with acute pains in his feet; there was no rise in temperature. After admission to hospital several very severe attacks of pain in the feet occurred and these extended as far up as the knees; at the same time pains in the hands and forearm as far as the elbows were complained of. During these crises the temperature was elevated from 38·8° C. to 39·9° C. and the patient was unable to refrain from crying out. He received injections of hermophenyl and "606." No quinine was administered. The patient rejoined his regiment, but returned to the hospital a second time with a note to the effect that he was suffering from syphilis and nervous troubles, with extremely painful crises in the arms and legs. The temperature at the time of second admission was 40° C. During the attacks of pain the temperature was elevated; there was slight oedema of the feet, and the knee jerks were absent. The blood showed malignant tertian parasites.

The authors at first hesitated in giving a definite diagnosis. The history of syphilis and the existence of malaria made it doubtful whether the crisis was due to his previous attack of specific disease or was caused by malaria. Specific disease was excluded because no benefit was derived from mercurial treatment, and two injections of "606" were given without effect. A diagnosis of neuralgic pains due to malaria was made, owing to the crisis occurring with the attacks of fever and the presence of malignant tertian parasites in the blood. All symptoms disappeared with rigorous quinine treatment and the patient was discharged in a perfect state of health, with his knee jerks present.

J. G. T.

ZUCCARELLI. **Paludisme Aigu; Complications Méningitiques; Signe de Kernig.**—*Bull. Soc. Path. Exot.* 1912. Nov. Vol. 5. No. 9. pp. 713-715.

Malaria is endemic on the east coast of Corsica between Bastia and Solenzara. The author describes a case of malarial fever in a young boy, aged 8, living in this district. The patient had had no previous illnesses and all his family were healthy. He evidently contracted malaria at Alistro railway station where anophelines were numerous. When seen by a doctor the boy was very ill; vomiting was very frequent, and the patient complained of headache; his temperature was elevated. KERNIG's sign and stiffness of the neck, with a continuous cry, enabled a diagnosis of meningitis to be made. The patient turned with difficulty in bed and the least effort caused sickness.

The author considers this to be a case of malaria showing signs of meningitis. The patient was given chlorhydrate of quinine 0·20 cgm. and pyramidon 0·05 cgm. every 6 hours; on the third day there was no fever; on the fourth day there was no headache. The pyramidon was stopped and 0·25 cgm. of quinine was given morning and evening. After a week of treatment the child refused quinine and the temperature again became elevated. Treatment was renewed, continued for a month, and a complete cure resulted.

[The author does not state whether he found parasites in the blood.]

J. G. T.

TREATMENT.

CESTAN (R.) & PUJOL (M.). **Paludisme et Arsenobenzol.**—*Gaz. des Hôpitaux Civ. et Milit.* 1912. Nov. 12. Vol. 85. No. 129. pp. 1793-1796. With 2 curves.

The authors draw attention to the fact that arsenic has long been used in the treatment of malaria. This drug has two therapeutic actions, a tonic and a parasitic. Since the introduction of "606" for the treatment of syphilis, the possibility of its use in the destruction of the malarial parasite has become a matter of much interest, especially in those cases which are resistant to quinine. The observations of WERNER, NICOLLE, CONSEIL, IVERSON and TUCHINSKY show that the efficacy of salvarsan depends on the particular type of malaria. The benign tertian parasite disappears altogether after an injection, but the parasite of the malignant type, although it disappears after treatment, tends to recur. In short, treatment by salvarsan cures the benign tertian, but does not prevent the recurrence of malignant tertian malaria.

The authors give a description of two cases of malaria which were treated with salvarsan, and they publish the temperature charts. [The type of malaria is not indicated but probably it was benign tertian.]

They point out that the injection of "606" should be given at the beginning of the attack of fever, when the young forms predominate. In the two cases reported a rapid recovery was obtained in both after a single intravenous injection.

An interesting observation is made regarding the Wassermann reaction in malaria. Böhm, Jaworski, Boermann and Wetter found a positive Wassermann in 20 to 40 per cent. of malarial cases. This has been disputed by Blasi and Tschiknawaroff. The authors point out that in their two cases a positive Wassermann was converted into a negative one by treatment with "606."

J. G. T.

Fusco (Vincenzo). **Il "606" nella Infezione Malarica.** [Salvarsan in Malaria.]—*Gazz. d. Ospedali e. d. Cliniche.* 1912. Nov. 14. Vol. 33. No. 137. pp. 1433-1434.

The author made observations on three cases of aestivo-autumnal malaria. Salvarsan in doses of 30 centigrammes was given in each case. The conclusion is that the aestivo-autumnal parasite is not destroyed by this drug, but nevertheless in one case it was useful in preventing relapses.

J. G. T.

Rosati (Beniamino). **La Splenectomia nella Malaria cronica con Cachessia in rapporto alla Emolisi Splenica.** [The Operation of Splenectomy for Chronic Malaria with Cachexia.]—*Gazz. Internaz. Med. Chir. Igiene.* 1912. Dec. 14. No. 50. pp. 1186-1193; and Dec. 21. No. 51. pp. 1205-1215.

The author gives a full description of three cases of chronic malaria with cachexia and enlarged spleen, in all of which the operation of splenectomy was performed. The first two gave a satisfactory result, but in the third death occurred; this was due to the serious condition of the patient who had great enlargement of the spleen. In all the cases profound anaemia and wasting, which were uninfluenced by medical treatment, were also present.

The blood changes before operation were as follows:—leucopenia, diminution of the red cells, diminished haemoglobin, poikilocytosis, with increase in the mononuclear leucocytes and blood platelets. In the third case there was no diminution in the leucocytes and the polymorphonuclears were in excess.

In the first two patients, who survived the operation, the blood examination after splenectomy revealed the following:—continued increase in the red blood cells as well as haemoglobin; a transient increase in the leucocytes, especially the polymorphonuclears.

The character of the blood in the two successful cases showed hyperactivity of the lymphatic glands in spite of the fact that these were not enlarged. The bone marrow, however, judging by the blood picture, showed little activity. In case 2 a month after the operation relapse of fever of an undoubted malarial character occurred accompanied by enlargement of the liver.

The results obtained in an investigation of the haemolytic properties of the serum can be given as follows: (*a*) The serum of the splenic vein gave excessive haemolysis of healthy red blood corpuscles, as well as those from the peripheral blood of the patient, and also those from the splenic vein itself. (*b*) The serum of the peripheral blood of the patients gave only a medium haemolysis of healthy red blood corpuscles, and those from the splenic vein, but had no action on the patients' own corpuscles in the peripheral circulation. This haemolytic power of the peripheral blood disappeared after operation.

In conclusion, the author says that the results obtained demonstrate that splenectomy represents the radical cure of chronic malaria with cachexia, since the spleen in this affection is not only seriously changed but has become an organ dangerous to life, acquiring the haemolytic properties which the author has demonstrated.

J. G. T.

PROPHYLAXIS.

LEGENDRE (J.). **Sur la Destruction des Moustiques à l'Aide du Filet.**—*Presse Méd.* 1912. Aug. 14. Vol. 20. No. 66. (Chronique.) p. 854.

The author describes a modified butterfly net which he advocates as a useful instrument for the capture and destruction of mosquitoes and flies. The gauze pocket is conical in shape and deep, and tapers to a point, instead of being rounded like the ordinary butterfly net. This modification prevents captured mosquitoes from escaping during the chase of others. With this net the author states that as many as 50,000 to 80,000 mosquitoes have been captured during a day in one establishment. He suggests that in the hands of young children it would provide a useful amusement.

J. G. T.

CARTER (Henry R.). **Antimalarial Measures for Farmhouses and Plantations.**—*U.S. Public Health Reps.* 1912. Dec. 6. Vol. 27. No. 49. pp. 2024-2030.

Malaria is essentially a rural disease; it is found in towns only as they approach rural conditions—that is, in small towns and in the suburbs of large cities—not in the bodies of large cities. For this reason antimalarial measures applicable to farmhouses and plantations are of interest. Carter fully discusses the subject of prevention under two headings (1) The measures involving the control of the human host. (2) Measures involving the control of the insect host.

He summarises his conclusions as follows:—

For farm houses antimalarial measures based on the control of both the human and the insect host should be used.

Of the first, the isolation of men sick of malarial fever from mosquitoes is the most important.

Of the second, draining mosquito breeding land near the house, especially to windward, is of great value.

Of almost equal value is the screening of the house. This is always possible. Drainage unfortunately is not always possible in many parts of the country. Until drainage is done screening must be our sheet anchor in preventing malarial fever in farmhouses.

The problem of drainage should be taken up both by the individual farmer and by the community, just as plantations and country roads are.

J. G. T.

GABBI (U.). **Malattie Infettive. Malaria.**—*Commissione Govern. p. l. Studio d. Malattie Tropicali nella Libia. Malattie Infettive e Malattie cutanée.* 1°. *Contributo ad opera di U. Gabbi, F. Scordo, G. Rizzuti.* (Ministerio d. Intern. ed. Guerra; Direz. Gen. d. Sanità Pubblica.) 1912. Messina; Stab. Tipograf. Guerriera. pp. 13-16.

Gabbi discusses tropical diseases in Cyrenaica and Tripoli. The use of quinine is unknown in some of the provinces, especially amongst the poor population of Tripoli; a service was established by which quinine was distributed free. Fifty-six patients were treated for malaria; of these 51 showed the malignant tertian type of fever, 3 were quotidian and 2 quartan. The attack of fever occurred about noon in all the 51 malignant tertian cases. With regard to the prevention of malaria Gabbi advocates the following precautions:—

(1) Keep the concentration camps of Arabs a good distance from Tripoli. (2) Use quinine prophylaxis in these camps—by giving quinine twice a week or every other day. (3) Give notice to Europeans that in choice of domestic servants they should not neglect to obtain a certificate from a medical man, certifying that they are free from chronic malaria.

J. G. T.

MISCELLANEOUS.

Southern Medical Journal. 1912. Aug. Vol. 5. No. 7. pp. 439-459.

This number contains the following original articles:—

(i) WHITE (J. H.). **The Eradication of Malaria.** pp. 439-444. (ii) JACKSON (T. W.). **A Malarial Hot Bed within sight of National Capital.** pp. 444-449. (iii) HENSON (Graham E.). **A Review of the Possible Aetiological Factors in Malarial Recurrence; the Significance of such Cases and their Treatment.** pp. 450-457. (iv) BOOTH (B. H.). **Pernicious Malaria with Cerebral Symptoms resembling Heat-stroke, with Report of Cases.** pp. 458-459.

(i) White discusses the problem of malarial prevention. The actual work of eradication of malaria is elemental in its simplicity, but calls for untiring watchfulness and absolute thoroughness. The author thinks that the increase of the population in the Northern and Middle States of America has practically obliterated malaria without any interference on the part of the physician, because the land owing to its value has been drained. In many parts of America, however, this condition does not exist, and so palliative measures have to be employed. Where thorough drainage is impossible exclude mosquitoes from houses by screening, drain small pools of water near at hand, oil those which cannot be drained, and never forget that gamete-carrying patients must be given quinine. It is advocated that the interest of the nation and the state ought to be aroused, and big swamps might thus be obliterated. The drainage of the huge swamps in the south would clear out malaria and yellow fever and render that part of America as healthy as Northern Europe.

(ii) Jackson discusses the presence of malaria at Fort Washington in a military reservation which is within sight of the Washington monument. A chart is given showing the monthly incidence of malaria cases for five years. The author says that quinine prophylaxis was a failure at Fort Washington. A campaign was begun against mosquitoes, and the population protected from bites. [This paper is to be continued.]

(iii) Henson gives a very full resumé of the causes of recurrences in malaria. The author thinks that parthenogenesis cannot be considered a factor in recurrence for the following reasons:—

> (1) The very existence of such a phenomenon is a matter of great doubt, many observers working over a period of years having failed to demonstrate such forms. (2) There are many cases reported that have at no time during the infection shown the sexual forms, but have frequently relapsed. (3) Four cases are cited by Ross in which inoculation experiments of blood containing only sexual forms failed in each instance to produce clinical symptoms of malaria, while in fifty-one cases cited by the same author, inoculation experiments of blood containing asexual parasites in every instance produced clinical symptoms of the infection.

The author says that asexual reproduction by schizogony is generally accepted as the cause of short interval relapses, but the length of time that the schizont is capable of keeping the infection alive in man without producing clinical symptoms is at present undetermined. The observations of CRAIG that certain forms of the plasmodia exist only when conjugation is present and often before gametes have appeared would indicate that they are a factor in recurrences of long intervals.

(iv) Booth draws attention to the fact that comatose malaria may be wrongly diagnosed as heat-stroke. In pernicious malaria the first indication of the attack is the development of acute delirium or sudden and deep coma. The temperature may be high or sub-normal. The pupils are contracted, usually pin point in character, and fail to react to light. The tongue is coated, usually having a whitish fur on it. The odour of the breath is sweetish. The respirations are shallow and vary from 20 to 50 per minute. All secretions are diminished and the pulse varies from 120 to 150 per minute. These symptoms simulate very closely those of heat-stroke. Four cases of comatose malaria are described; all made a good recovery after antimalarial treatment.

A discussion followed. VON EZDORF adhered to the parthenogenetic theory as the cause of relapses. SCHAUDINN, he said, believed in it and reported having observed it. MCELROY saw no evidence from a study of the blood that conjugating forms developed in the body, but on the other hand he thought that parthenogenesis was a well established principle. Henson in closing the discussion thought that the thick film method of Ross was very useful in diagnosis, and advocated the treatment of patients for two to four weeks with 30 grains of quinine daily. The disagreeable symptoms caused by the quinine disappear very largely after a week's treatment.

J. G. T.

SIMPSON (G. C.) & EDIE (E. S.). **On Haemoglobin Metabolism in Malarial Fever. Part ii. The Influence of Quinine.**—*Ann. Trop. Med. & Parasit.* 1912. Dec. 30. Vol. 6. No. 4. pp. 443-447.

In a previous paper it was shown that the amount of haemolysis proceeding in the body can be measured to some extent by the total excretion of urobilin. In malaria a high degree of haemolysis is followed by a high excretion of urobilin in the faeces, and sometimes also in the urine. In another paper (see this *Bulletin* No. 1, p. 21) it was shown that a haemolytic principle occasionally can be demonstrated in malarial serum; this action is most likely to be shown by the serum of a benign tertian case drawn at the onset of a paroxysm.

Simpson and Edie now contribute a further paper on their researches carried out in the Liverpool School of Tropical Medicine. Their conclusions are as follows:—

(1) Increased excretion of urobilin may occur after the administration of quinine in doses of ten to thirty grains a day. A similar result follows injection of blood pigment or haemolytic drugs.

(2) Quinine probably possesses the power of determining haemolysis in the body, though the exact mechanism of its action must be further investigated.

(3) Individual or pathological idiosyncrasy may exaggerate this action and so account for the influence of quinine in blackwater fever.

J. G. T.

O'CONNELL (Matthew D.). **The Meteorology of Malaria.**—*Jl. Trop. Med. & Hyg.* 1912. Aug. 15. Vol. 15. No. 16. pp. 245-246; and Nov. 15. No. 22. p. 340.

The first paper deals with Allahabad. Here the night atmosphere in September, when malaria is prevalent, is compared with that in the humid cotton weaving sheds of Lancashire. The temperature at Allahabad is nearly as high and the humidity is much greater. Hence exposure to the night atmosphere at this town in September must raise the body temperature more than exposure to the atmosphere in the cotton sheds. The author regrets that malariologists never discuss the effect of exposure to the night atmosphere on body temperature. They mention meteorological conditions only in the briefest manner, and then merely point out their effect on mosquitoes and their larvae, or on the extra-corporeal phase of the malarial parasites, the oocysts of which are said to develop best at 68° F. to 86° F., and are killed by temperatures below 60·8° F. During the height of the malaria season in Allahabad (September) the night temperature ranged from 77·3° F. to 84·7° F. dry bulb, with a relative humidity per cent. of 93·0 to 74·0.

In the second paper the author gives, through the kindness of the Deputy Director of the Madras Observatory, hourly observations of the dry and wet bulb temperatures, and the velocity of the atmosphere at Madras from 6 p.m. on September 21 to 6 a.m. on September 22, and from 6 p.m. on September 22 to 6 a.m. on September 23 1912; that is, for two nights in what is known as the unhealthy season in India.

Tables are given shewing a comparison between the atmospheric conditions in Madras and those of the cotton sheds in Lancashire. The inference is that immersion in the September night atmosphere at Madras must produce pyrexia in a considerable number of the inhabitants.

J. G. T.

ADIE (Helen A.). **Note on the Sex of Mosquito Larvae.**—*Ann. Trop. Med. & Parasit.* 1912. Dec. 30. Vol. 6. No. 4. pp. 463-464. With 1 plate.

The dark or brown testis can be distinguished in living anopheline larvae by a lens; or, if the larva is very young, say about three days old, by a two-thirds lens. Often the testes are more easily seen from the ventral surface. In the female larva the ovary lies in about the same situation as the testis in the male, but stretches through two or three segments owing to its length. Figures are given showing the position of the testes, which are situated at the 6th abdominal segment. Other figures show some of the more minute structure of the sexual organs.

J. G. T.

RELAPSING FEVER.

TRANSMISSION.

DEUTZ. **Über Versuche zur Übertragung von Hühnerspirochäten auf Mäuse.** [Experiments to Infect Mice with the Fowl Spirochaete.]—*Hygienische Rundschau.* 1912. Aug. 15. Vol. 22. No. 16. pp. 1017-1019.

By means of intravenous and intraperitoneal injections of 0·5 cc. of the blood of a fowl heavily infected with spirochaetes, the author was able to infect mice with *S. gallinarum.* After an intravenous injection the parasites could still be found in the blood of the mouse 72 hours later, whilst, after an intraperitoneal injection all disappeared within 24-48 hours, phagocytosis taking place more rapidly in the peritoneal cavity than in the blood. By means of intravenous injections the fowl spirochaete could be transmitted from mouse to mouse for only two passages, but by the employment of intraperitoneal injections into very young mice (ten to twenty days old) three passages were obtained. A mouse which has once been infected with this parasite cannot be reinfected and its serum contains certain substances (immobilisins) which at once arrest all motion of the spirochaetes. Thus, when the serum of a recovered mouse is mixed with blood containing fowl spirochaetes, the latter are quickly immobilised and subsequently devoured by the phagocytes, whereas normal mouse serum has no effect on the parasites. When the spirochaetes are disappearing from the circulation of a mouse the number of blood platelets increases enormously.

In conclusion, the virulence of a strain of fowl spirochaetosis is considerably diminished by passage-through a mouse, the incubation period in fowls being lengthened from 48 hours to more than six days.

E. Hindle.

CULTIVATION.

NOGUCHI (Hideyo). **Cultivation of** *Spirochaeta gallinarum.*—*Jl. Experimental Med.* 1912. Nov. 1. Vol. 16. No. 5. pp. 620-628. With 1 plate.

Employing the same culture media and methods as those used in the cultivation of other spirochaetes (see this *Bulletin,* No. 1, p. 40) the author has succeeded in cultivating *Spirochaeta gallinarum* for many successive generations. The most suitable fresh tissue to employ was found to be a piece of either the pectoral muscle of a fowl, or rabbit's kidney, and a certain amount of oxygen seems to be necessary, for in vacuo the spirochaetes were unable to grow.

The maximum growth is reached about the fifth day, after which degeneration slowly commences, and the parasites usually disappear entirely within 15-21 days from the inoculation of the culture. In one case, however, living spirochaetes were observed in a culture thirty days old, that had been kept at 37° C. the whole time. The spirochaetes still remained virulent for chickens after having passed through at least thirteen sub-cultures, but at times individual cultures under certain conditions suddenly lost their virulence. The inoculation of such cultures into fowls produced no infection, but rendered the birds refractory to subsequent inoculation with a virulent strain.

The author adds some remarks on the morphology of the parasite as observed in cultures. Those grown in media containing rabbit kidney instead of chicken muscle are somewhat thicker than usual but otherwise are normal in behaviour. The author has never seen longitudinal division in this species; unmistakable examples of tranverse division preceded by strangulation (= incurvation) have been observed, thus confirming HINDLE's account of the division of the *S. gallinarum*. The many small round or oval granules that appear in old cultures are considered to be degeneration products, as the author was unable to cause their development into spirochaetes either in cultures or by inoculation into chickens. The larger round bodies, 0·75μ in diameter, formed either at one end or along the length of the spirochaete are considered to represent a stage in the life-cycle, and not plasmolysis as described by HINDLE. The author states that at no period of cultivation did any bacillary forms appear, such as those present in the tick.

Several filter experiments were performed to ascertain whether cultures of *S. gallinarum* contain any form which passes through a Berkefeld filter (V), but no infection was ever produced by the inoculation of the filtrate into chickens. Moreover the filtrate did not contain any form that could be grown in culture media. Similar results were obtained in the case of cultures of *S. duttoni*, *kochi* (= *rossi*), *obermeieri* (= *recurrentis*), and *novyi*, respectively.

E. H.

SYMPTOMATOLOGY.

CASAUX (J.). **Considérations Cliniques sur la Fièvre Récurrente en Indochine.**—*Rev. de Méd. et d'Hyg. Trop.* 1912. Vol. 9. No. 2. pp. 97-118.

After a brief summary of the history of relapsing fever in various parts of the world, in the course of which the author mentions that this disease was first recorded in Indochina in 1907, Casaux proceeds to a description of the clinical features of the malady in Indochina.

Five distinct types are recognised:—

(1) The Ambulatory Form, which is so benign that the patient is almost unaware of its presence. It is characterised by the presence of spirochaetes in the blood unattended by any pathological symptoms, with the possible exception of slight fever.

(2) The Ordinary Form, characterised by attacks of moderate severity, without diarrhoea, constipation, or severe febrile symptoms. The patient may present one, two, or even three attacks, after which recovery is complete.

(3) The Typho-Bilious Form, first recognised by GRIESSINGER in Egypt. This type of relapsing fever is characterised by the occurrence of rather severe febrile attacks accompanied by bilious

vomiting and diarrhoea. The spleen and liver are much enlarged and there is excessive muscular hyperaesthesia. A noteworthy feature is the marked epistaxis towards the end of each attack; the temperature falls as low as 34·2° C. before returning to the normal. This form not infrequently causes the death of the patient, usually during the first febrile period or the interval between it and the relapse.

(4) The Typhoid-like Form, distinguished by its resemblance to typhoid. There is abundant yellow, serous diarrhoea; the stools are sometimes mixed with blood. The temperature is irregular without any marked intervals between the febrile attacks.

(5) The Bilious Form, is distinguished by the occurrence of marked jaundice commencing suddenly on the first or second day of the attack. The liver is very painful both on pressure and percussion. Usually this form is associated with constipation and the stools are not discoloured, but occasionally, on the contrary, there is a bilious diarrhoea.

In addition the author gives some useful summaries of the frequency with which the various symptoms appear. Out of 161 cases, 44 suffered from only one febrile attack; 55 showed two attacks; 37, three; 19, four; 3, five; and 3, six attacks. The average duration of the first attack was six days; the interval between this and the second attack, eight days; duration of the second attack, four days; second interval, seven days; third attack, three days.

In conclusion the author advocates the use of intravenous injections of 0·2-0·3 gms. salvarsan in the treatment of this disease in China.

E. H.

Browse (G. V.). **A Special Type of Recurrent Fever due to a Spirochaeta.**—*Indian Med. Gaz.* 1912. Oct. Vol. 47. No. 10. pp. 387-390.

This paper contains an account of a distinct type of relapsing fever occurring at Quetta, a hill town on the frontier of Baluchistan. The disease is shewn to be due to a spirochaete, morphogically identical with *S. duttoni* and *S. recurrentis*. The clinical symptoms, however, differ from those of recurrent fever, especially in the mild nature of the disease and the distinctive type of pyrexia with many paroxysms of short duration. There is a poorly marked polymorphonuclear leucocytosis with a well marked relatively large mononuclear increase. In the latter features it differs from European relapsing fever, but resembles it in some of the clinical features. It resembles the relapsing fever of Tropical Africa, but develops under such very different climatic conditions that it is regarded as distinct. In one year eighteen cases were observed, most of them amongst the regimental followers who lived in dark huts adjoining the barracks. In spite of their proximity the disease did not occur amongst the soldiers living in the barracks.

The clinical features are described as follows:—

> "The onset was sudden with a feeling of cold but no actual rigor. Vomiting was the exception and in no case was jaundice or rash noticed. All the patients invariably felt perfectly well directly the fever ceased and much resented being detained in hospital. A few, after late relapses became anaemic and debilitated, otherwise the disease was trivial in its effects. Pains in the limbs and joints were not uncommon, but were only marked in three cases out of the eighteen. Eight patients had enlargement of the spleen on admission, but of these, five were men with chronic splenitis not due to the spirochaetae. Pain and tenderness over the spleen and liver during the fever paroxysms was observed in three cases, but was the exception."

The temperature follows a course resembling that of African relapsing fever and it is also interesting to note that, as in the case of this latter disease, foreigners are more liable to infection than the natives. Out of sixteen cases the number of febrile paroxysms in each was as follows:—

Number of paroxysms ...	1	2	3	4	5	6	7
,, cases	2	3	3	2	2	3	1

The paroxysms usually lasted from 48 to 64 hours at the commencement of the disease and gradually diminished in length and intensity.

In addition the author discusses the possible mode of transmission of the infection. *Cimex* and *Pediculus* are put out of count because, from their large numbers, there ought to have been many more cases of the fever if these animals had been responsible for the transmission. In the same buildings where the disease occurred, considerable numbers of *Ornithodorus tholozani* and one example of *Argas persicus* were found. One experiment was made with the former of these parasites, ticks which had fed on an infected patient being allowed to feed on a healthy person, but the result was negative. The author considers it improbable that *O. tholozani* carries the disease, because from its voracious habits more of the people inhabiting the building would have been likely to become infected. He suggests that if *A. persicus* were the carrier, it would explain the rarity of the disease, for this tick only exceptionally bites man. The question arises whether the disease is the same as miana occurring in Persia and said to be conveyed by *Argas persicus*.

The description of this interesting Quetta spirochaetal fever is accompanied by charts and tables illustrating the clinical features of the disease.

E. H.

JUKES (A. M.). **Preliminary Note on Some Cases of Spirillar Fever in the Darjeeling District.**—*Indian Med. Gaz.* 1912. Dec. Vol. 47. No. 12. pp. 476-477.

The author describes the presence of small localised epidemics of fever in the Darjeeling district, the diagnosis of which has presented some difficulty. In particular, an epidemic of fourteen cases is described which occurred in one small isolated group of houses, amongst the Gurkha Tea Garden coolies. The patients fell ill in batches of two or three at a time, with intervals of about three weeks separating the batches. All the patients presented the same symptoms, *i.e.* fever, usually about 101° to

102° F., but in some cases going up to 104° to 105° F.; headache; jaundice with varying intensity; nausea, but no vomiting; there was no albuminuria. The first eight patients became delirious, comatose and died about the seventh or eighth day of the disease. The next three recovered but were still weak when seen by the author and the last three were still ill and had had fever for about six days. These last three patients eventually recovered.

Spirochaetes (one to six per field) were found in the blood of one of these patients, but the examination of the other two was negative. There is little doubt, however, that all these fourteen cases had suffered from the same disease.

Since this epidemic the author has observed spirochaetes in the blood of three other patients from different localities in Darjeeling, and in every case the symptoms were the same as those described above. Two were middle-aged men who both recovered after being very seriously ill for some days; the third was a pregnant girl of 20, who miscarried and afterwards died on the ninth day of the disease. All these patients stated that others members of their families had suffered from the same disease, and in several cases death had resulted. Blood from these three patients was examined daily and in every case there was a diminution in the number of spirochaetes after about the sixth day, together with a simultaneous rise in the number of polymorphonuclear leucocytes. This was very marked in the case of the girl who died, who had a high leucocytosis and an absence of parasites the day before her death. In the other two patients the spirochaetes disappeared about the eighth or ninth day.

The author regards this as a new form of "spirillar fever" for the following reasons:—

"1. The severity of the illness and the high mortality accompanying it.

"2. The duration of the fever 8 to 10 days.

"3. The absence of relapses in those who recover."

In addition the author inclines to think that the spirochaete is shorter, thinner and less motile than *S. recurrentis*, but no stress is laid on this point. Attempts to keep the spirochaete alive, either in culture media, or by inoculation into white rats, were unsuccessful.

[The extreme severity of these cases of relapsing fever is very remarkable, and combined with the absence of relapses and the long duration of the fever, the Darjeeling relapsing fever may represent a distinct variety. It should be remembered, however, that under adverse conditions the mortality from relapsing fever may be very high, for DUTTON and TODD* mention one case in which, out of twenty carriers in one caravan who contracted the relapsing fever of Tropical Africa, no less than ten died.]

E. H.

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* **DUTTON and TODD (1905). The Nature of Human Tick-fever in the Eastern Part of the Congo Free State.** ***Liverpool School of Tropical Medicine. Memoir*** **XVII. p. 3.**

TREATMENT.

LAUNOY (L.) & LEVADITI (C.). **Nouvelles Recherches sur la Thérapeutique Mercurielle des Spirilloses (Sp. des Poules et Syphilis du Lapin).**—*Compt. Rend. Soc. Biol.* 1913. Jan. 10. Vol. 74. No. 1. pp. 18-21.

The authors have continued their researches on the therapeutic action of organic mercury compounds* and in the present article discuss the action of a new group of products, the dinitro and diamino derivatives of the mercury salt of paradioxydiphenyl. The only one that was found to be of any practical use was the diacetyl derivative of the mercury salt of dioxydiaminodiphenyl. For convenience, this compound is referred to as No. 114. It contains 42·8 per cent. of mercury and is employed in alkaline solution, prepared as follows:—0·2 gms. No. 114 + 2 cc. N/-NaOH + 18 cc. of 9 in 1000, NaCl solution.

Employing the intravenous mode of injection, the toxic dose for the rabbit was found to be 0·04 to 0·05 gms. per kilo., and for the fowl 0·05 gms. per kilo. (of body weight). The authors tested the effect of the compound on *Spirochaeta gallinarum* in fowls. One fowl, that received an injection of 0·04 gms. per kilo. twenty-four hours after being inoculated with the disease, was cured. Two others were injected with equal quantities of the drug, one at the time of inoculating the spirochaete, and the other when the parasites were numerous in the circulation. Neither was cured and the second fowl died as a result of its diminished resistance to the toxic effect of the compound.

The authors also give the results of treating five rabbits experimentally infected with syphilis in the scrotum. Three of the rabbits were cured, but large doses had to be employed (0·03 to 0·04 gm. per kilo.), and in two of them a second injection was required. In one case, however, a single dose of 0·035 gms. per kilo. completely cured a rabbit in twelve days.

Although this compound possesses such a feeble toxicity, the curative dose approaches so closely to the toxic one that in all the animals cured a marked diminution of the body weight was observed as a result of the injection. This diminution, however, was only temporary and the animals quickly recovered their loss in weight.

E. H.

CASTELLI (G.). **Ueber Neosalvarsan.**—*Zeits. f. Chemotherapie.* 1. Teil. Orig. 1912. Vol. 1. No. 2. pp. 122-135.

The author has studied the action of neosalvarsan in vitro on *Spirochaeta gallinarum, S. recurrentis* and *Trypanosoma brucei* respectively. After contact with the drug for periods of fifteen to sixty minutes all these parasites were still actively motile, but had lost their vitality; for when injected into animals they produced no infection. In order to eliminate the introduction of any of the drugs together with the parasites, the mixtures of neosalvarsan and parasites were centrifuged, by which means the latter were separated from the solution. Solutions of atoxyl had not this parasiticidal action in vitro, the parasites maintaining their virulence. These results shew that there is a direct combination of neosalvarsan with the chemoreceptors of the parasites. This combination seems to occur only in those arsenical compounds containing trivalent arsenic.

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* LAUNOY & LEVADITI. *Compt. Rend. Soc. Biol.* 1912. April 27. Vol. 72. p. 653.

The author comes to the following conclusions respecting the action of organic arsenical compounds on parasites. First, the most important factor is the direct combination of the drug with the chemoreceptors of the parasite, quickly arresting its development; secondly, other combinations of the medicament with the body cells of the host, resulting in the formation of substances which directly kill the parasites; and thirdly, it is not impossible that the parasiticidal action of these compounds is supplemented by the action of the body cells of the host.

[It is to be regretted that this interesting paper should contain a number of wrong reference numbers in the text, making it somewhat difficult to look up the literature to which the author refers.]

E. H.

CASTELLI (G.). **Ueber Neosalvarsan. Bestimmung der Toxizität und der heilenden Wirkung bei experimentellen Spirochätenkrankheiten.** [Neosalvarsan. A Determination of its Toxicity and Curative Action on Spirochaetal Infections.]—*Zeitschr. f. Chemotherapie.* I. Teil. Orig. 1912. Vol. 1. No. 3. pp. 321-351. With 1 plate.

The author compares the toxicity of neosalvarsan with that of salvarsan in mice, rabbits, fowls, and pigeons, respectively. Both subcutaneous and intravenous injections were employed and the results clearly show that whereas neosalvarsan is much less toxic than salvarsan when administered intravenously, when the drugs are injected subcutaneously salvarsan is less toxic than neosalvarsan. The author's results are summarised in the following table which gives the *Dosis tolerata* of the two drugs in the above-mentioned animals, employing the two methods of injection.

Animal.	Method of Injection.	*Dosis Tolerata* Salvarsan	Neosalvarsan
Mouse (per 15 gms.) ...	Intravenous	0·002145 gm.	0·00375 gm.
	Subcutaneous	0·00375 "	0·001275 "
Fowl (per kilo.) ...	Intravenous	0·08 "	0·06 "
	Subcutaneous	0·25 "	0·1 "
Pigeon " ...	Intravenous	0·08 "	0·12 "
	Subcutaneous	0·09 "	0·04 "
Rabbit " ...	Intravenous	0·1 "	0·2 "
	Subcutaneous	0·15 "	0·1 "

When neosalvarsan is injected either subcutaneously or intramuscularly it is more rapidly oxidised in the tissues than salvarsan, and in consequence is more toxic. It is evident, therefore, that the intravenous method is the only one suitable in the use of neosalvarsan.

The second part of the paper contains an account of the action of neosalvarsan on infections respectively of *Spirochaeta recurrentis* in mice, fowl spirochaetosis, and syphilis in rabbits. Mice infected with a virulent strain of relapsing fever were cured only on the first day of infection by a subcutaneous injection of 1 cc. of a $\frac{1}{400}$ solution of neosalvarsan (per 20 gms.), whereas the subcutaneous injection of an equal amount of salvarsan invariably cured the mice even at the height of the infection. When the drugs were administered intravenously, a 20 gm. mouse on the first day of infection required a dose of 1 cc. of $\frac{1}{300}$ solution of neosalvarsan in order to be sterilised, whilst a dose of 1 cc. of $\frac{1}{500}$ salvarsan is sufficient to produce the same curative effect. In comparing the values of the two compounds, however, their toxicities should also be taken into account and then one finds that neosalvarsan is two and a half times as effective as salvarsan. With fowl spirochaetosis the author obtained exactly similar results.

The rabbits employed were infected with syphilis by means of subcutaneous injections into the testicles. The strain of syphilis was very virulent and all the rabbits injected developed typical chancres on the scrotum. The animals were then injected with solutions of either salvarsan or neosalvarsan and the results compared. The action of both compounds was very marked, the chancres usually being completely cured within an average of about 26 days; the healing of the sores is well illustrated by a series of photographs. A comparison of the curative doses respectively of the two compounds shews that neosalvarsan is at least twice as effective as salvarsan in the treatment of syphilis in rabbits.

Finally the author summarises the advantages of neosalvarsan as follows:—Its great solubility and the neutrality of the solution. Moreover its curative action on rabbit syphilis is twice as great as that of salvarsan and in other spirochaetal infections the difference in the curative action is equally well shewn.

Although only through clinical experience can one know what will be the effect of neosalvarsan on human spirochaetal infections, the above described data certainly indicate that the new compound is likely to be even more useful than its forerunner, salvarsan.

E. H.

MESSERSCHMIDT (Th.). **Die chemotherapeutische Beeinflussung der Hühnerspirochätenkrankheit, durch die im Handel befindlichen Jodpräparate.** [The Chemotherapeutical Action of some Commercial Iodine Preparations on Fowl Spirochaetosis.]—*Zeitschr. f. Immunitätsforchung.* 1. Teil. Orig. 1912. Nov. 2. Vol. 15. Nos. 2 & 3. pp. 293-302.

Employing fowls infected with *Spirochaeta gallinarum* as indicators, the author has tested the effects of a number of commercial iodine preparations on spirochaetes. The only one which was found to have any action was the sodium salt of sozoiodol (= Na salt of di-iodo-para-phenol sulphonic acid). This compound merely had a preventive action when injected into the fowls daily from the time they were inoculated with the parasites. Under these conditions the fowls merely shewed a slight infection and soon recovered, whereas all the controls died. On the other hand, once the spirochaetes were present in considerable numbers in the blood the injection of the compound had no effect. It is evident, therefore, that iodine compounds are of very little use in the treatment of fowl spirochaetosis.

E. H.

MOUNEYRAT & TANON. **De l'Action de Nouveaux Dérivés Arsenico-sulfurés dans les Trypanosomiases et les Spirilloses expérimentales.**—*Rev. de Med. et d'Hyg. Trop.* 1912. Vol. 9. No. 2. pp. 139-146.

The present article calls attention to the fact that MOUNEYRAT and not EHRLICH was the first to suggest the use of neosalvarsan in the treatment of syphilis. The paper contains an account of the chemical constitution and derivation of various arsenical organic compounds. In conclusion the authors mention some inconclusive results obtained in the treatment of infections of *S. duttoni* and *Trypanosoma gambiense* by one of these substances (the monomethylene sulphonate derivative of salvarsan).

E. H.

KOCH (W. V. M.). **Relapsing Fever and its Treatment by Salvarsan.**—*Far Eastern Association of Tropical Medicine: Trans. Second Biennial Congress held at Hong Kong.* 1912. pp. 272-277.

The author gives an account of the treatment of two patients suffering from relapsing fever, a disease which is rarely seen in Hongkong, though common in North China, and some parts of South China. The patients were injected intravenously with respectively 0·5 and 0·6 gms. of salvarsan. In both cases the parasites disappeared from the circulation within six hours and the patients rapidly recovered. In its action it seems to imitate a natural recovery; there being the preliminary fall in the temperature, the rigor, and then the sudden drop to the normal together with the disappearance of the parasites from the blood.

A table is given shewing differential leucocyte counts of cases of relapsing fever and primary and secondary syphilis respectively. These were made every six hours after injection of salvarsan and the results shew that leucocytosis is much more marked in the case of relapsing fever than primary syphilis. There was no marked variation in the case of secondary syphilis.

Two of the cases of relapsing fever came from one house and the author considers it probable that either bugs or lice must have been carriers.

E. H.

CLASSIFICATION.

DOBELL (Clifford). **Researches on the Spirochaets and related Organisms.**—*Arch. f. Protistenkunde.* 1912. Vol. 26. pp. 119-240. With 5 plates.

Although in the present paper the author has studied non-parasitic spirochaetes only, his results are of great importance from a general point of view, as they conclusively shew the bacterial affinities of this group. After a description of a number of new species of spirochaetes belonging to three different genera, and also some closely related organisms, the structure and life-histories of the spirochaetes are discussed in an analysis, which also includes a review of previous work on the subject. There is no antero-posterior differentiation in the group, each extremity being alternately anterior and posterior, a character which is characteristic of most plants and not of the Flagellates. In addition the body is flexible and capable of plasmolysis, but there is a gradation in these characters from the comparatively rigid and non-plasmolysable *Bacillus flexilis*, through *Paraspirillum vejdovskii* and *Saprospira* up to the very flexible and easily plasmolysed *Treponema*. In all cases where the organism is sufficiently large to decide the point, the protoplasm of the spirochaetes is found to present a chambered structure. A definite nucleus is absent, the chromatin being distributed in the form of chromidia. Special organs of locomotion are absent. In every case, Dobell has only seen transverse division, sometimes binary and in other case multiple. Longitudinal division has never been observed and the author is convinced that it does not occur in the group. In spite of certain peculiarities this transverse division resembles that of Bacteria and Cyanophyceae. The life-cycle is very simple and comprises neither cyst formation, sexual phenomena nor polymorphism. The transverse dimensions of any particular species are always constant but the length is variable as in Bacteria.

The author recognises four genera—*Spirochaeta*, *Cristispira*, *Treponema* and *Saprospira*,—as constituting a natural group known as the *Spirochaetoidea*. This group is far removed from the Flagellata but presents some affinities with the Cyanophyceae. As it agrees with the Bacteria in every character except the absence of locomotive organs the author considers that the spirochaetoidea should be classified with the Bacteria, being placed next to the Spirilloidea. The classification of the Bacteria which is adopted is as follows:—

$$\text{Schizophyta}\begin{cases}\text{Bacteria} \begin{matrix}\text{Haplobacteria}\\ \text{Trichobacteria}\end{matrix}\left\{\begin{matrix}\text{Coccoidea}\\ \text{Bacilloidea}\\ \text{Spirilloidea}\\ \text{Spirochaetoidea}\end{matrix}\right.\\ \text{Cyanophyceae}\end{cases}$$

[It should be noted that Dobell employs the term *Treponema* to include a large number of forms, such as the blood spirochaetes, that are usually regarded as belonging to different genera. It is doubtful whether this view of the close affinity of *Treponema* (sensu SCHAUDINN) with the blood spirochaetes will be adopted by many authors, but it is certainly necessary to distinguish the parasitic forms from the free living spirochaetes to which the name *Spirochaeta* was first applied. At the present time the terminology of the blood spirochaetes is in such a state of confusion that it is doubtful what generic name should be applied to them. After the large number of misunderstood and frequently erroneous observations that have been published on the morphology and life-histories of Spirochaetes, it is with pleasure that one reads the present paper, which is undoubtedly the most important contribution to our knowledge of these organisms that has hitherto been published. In the present place it is only possible to give the merest outline of the author's conclusions and the paper should be read in its entirety by anyone desirous of a fuller knowledge of the morphology and systematic position of the Spirochaetes. The Schaudinnian belief in the flagellate affinities of these organisms has finally been shewn to be erroneous and it is to be hoped that no subsequent writer will ever attempt to resuscitate such a view.]

HOFFMAN. **Zur Stellung der Spirochäten im System.** [The Systematic Position of Spirochaetes.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1912. Oct. 29. Vol. 66. No. 7. pp. 520-523.

The author adds a few notes on the morphology of *Spirochaeta* (= *Treponema*) *pallida* as observed in cultures, and produces evidence in support of GROSS' view that the pathogenic spirochaetes belong to the Spironemacea. Evidence of the chambered structure of *S. pallida* is shewn by those degenerating forms that present sharply defined swellings either at the ends or along the length of the body. In addition the breaking up of the spirochaete into numerous spore forms has been observed in preparations of the parasite obtained from cultures. The author has never seen any sign of longitudinal division in this species and believes that it invariably divides transversely into two or sometimes more individuals, in the latter case resembling the division of *Saprospira*. In the cultures it is noticed that the spirochaetes tend to adhere by their extremities, thus producing very long compound forms that move about as if they were single individuals. Here again is evidence of the relation to *Saprospira*, which also forms long chains of individuals. The author was able to find evidence of the existence of a vegetable membrane surrounding the body of the spirochaete.

In conclusion Hoffman points out the importance of the observations of GROSS on the spore formation in spirochaetes, as these spores are probably formed in the blood and other parts of the body of patients suffering from spirochaetal diseases and might easily be overlooked.

[The observations of this author are of considerable interest as they tend to shew that *Treponema pallida* presents the same features of transverse division and spore formation that has been observed in other pathogenic spirochaetes. It should be pointed out, however, that the spore formation in spirochaetes was observed by BALFOUR and others long before GROSS published his observations on the Spironemacea.]

E. H.

MISCELLANEOUS.

MARCHOUX (E.) & COUVY (L.). **Argas et Spirochètes.**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 796-798

The authors have investigated the nature of the granules (= coccoid bodies) described by many workers as a stage in the life-cycle of spirochaetes. Continuing their previous researches, they state that spirochaetes may be found in the coelomic fluid of *Argas* that have been kept at 15° C. for eleven months. Accordingly the successful inoculation experiments of LEISHMAN, BALFOUR, HINDLE, etc., are explained as the result of the presence of spirochaetes in the tissues. The parasites are extremely fine and cannot be stained with Giemsa, but only with Gentian violet or some equally intense method.

With regard to the granules the authors have found them in *Argas vespertilionis* from Timbuctoo, *Rhipicephalus* (? *Ixodes*) *ricinus* from France, and also in *Loelaps echidninus*. In the two former the granules were found to elongate under the influence of heat in a similar manner to those occurring in *Argas persicus*. The authors then state that as the granules appear to exist in all the Acariens they have no connection with the spirochaetes.

[In spite of these observations it should be remembered that LEISHMAN and HINDLE have both examined other species of ticks without finding any granules in their tissues. *A. vespertilionis* is a parasite of bats and the latter are well known to be subject to infection with spirochaetes, and the probabilities are that this tick is the intermediate host. Moreover *Ixodes ricinus* feeds on a variety of mammals, many of which are subject to spirochaetosis, therefore, it might easily be infected. The evidence which has been brought forward is certainly not sufficient to disprove the spirochaetal nature of the granules and to warrant the statement that they appear to be present in all Acariens.]

E. H.

HARRISON (L. W.). **A Modification of the Burri Method of Demonstrating** *Spirochaeta pallida.*—*Jl. R. Army Med. Corps.* 1912. Dec. Vol. 19. No. 6. p. 749.

The author finds that a more homogeneous field is easily obtained by substituting for Chinese ink a suspension of collargol. The latter is prepared according to the directions of the makers (Chemische Fabrik von Heyden), one part of the powder being mixed with nineteen parts of distilled water. The powder is put into a black bottle and the water poured on it. After standing for a few minutes the bottle is well shaken and again allowed to stand, when after a final shaking the mixture is ready for use. The suspension is used in exactly the same way as if it were Chinese ink, a loopful of the suspected serum and one of collargol being mixed together at one end of a slide and then spread like a blood-film.

The film may be examined with an oil-immersion lens as soon as it is dry; the spirochaetes appear white on a reddish-brown field, which is almost perfectly homogeneous.

In addition attention is called to the necessity of carefully cleaning the surface of any sores before examination, as under dark-ground illumination the author has observed extremely delicate spirochaetes in the secretion obtained from the surface of sores that were non-syphilitic.

E. H.

de Gasperi (F.). **Présence d'un Spirochète dans le Sang d'un Cobaye.**—*Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 589-561.

This spirochaete was obtained in glucose-lactose gelatine cultures of the heart blood of a guinea-pig that had been injected subcutaneously with some garden soil mixed in a mortar with water at 85° C., in order to isolate a septic vibrio. The animal died twenty hours later of typical septicaemia and in the cultures of its blood spirochaetes were observed living side by side with the vibrio in the water of condensation.

The length of the parasite varies from 9·6μ to 24μ and the diameter from 0·3 to 0·4μ. The long forms have five, six, or eight undulations. The extremities are distinctly pointed. Division forms were not observed and as the spirochaetes died in the cultures within 48 hours it was not possible to make a further study of them.

The author injected ten other guinea-pigs with garden soil in order to see whether this procedure was responsible for the appearance of spirochaetes in their blood, but in no case were the parasites obtained in cultures made in the same way as the above, though vibrios were developed in each culture. Accordingly the author believes that this spirochaete is a specific parasite of the guinea-pig.

E. H.

Henry (Herbert). *Spirochaeta pollachii*: **A New Blood-Inhabiting Spirochaete from** *Gadus pollachius*, **the Pollack: With a Note on the Occurrence of Certain Intra-Corpuscular Bodies in the Blood of the Gadidae.**—*Jl. Path. & Bact.* 1912. Oct. Vol. 17. No. 2. pp. 160-164. With 1 plate.

The author describes a new species of parasite found in the blood of *Gadus pollachius* captured in Port Erin Bay. The parasite was only found twice out of 348 fish examined. In addition intra-corpuscular inclusions were found in several of the specimens and the author suggests that these may represent encysted phases of a spirochaete. There are some difficulties, however, with regard to their interpretation for the blood corpuscules of the *Gadidae* frequently present degeneration forms practically identical with the intra-corpuscular bodies. In view of Balfour's work on *S. gallinarum*, the author inclines to the view that they represent a stage in the life-cycle of the spirochaete, for they closely resemble the intra-corpuscular bodies occurring in fowls.

E. H.

PROWAZEK (S. v.). **Einfluss hämolytischer Stoffe auf Spirochäten (Spironemacea).** [The Effect of Haemolytic Substances on Spirochaetes.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1912. Oct. 12. Vol. 66. Nos. 5 & 6. pp. 424-426.

The author shews that fowl spirochaetes removed from the blood by centrifuging and subsequently washed in saline are completely immobilised by the addition of ten per cent. saponin. A ten per cent. solution of sodium taurocholate and a two per cent. solution of smilacin, respectively, dissolved the spirochaetes completely, whilst bacilli exposed to these solutions for equal lengths of time were apparently unaffected.

E. H.

TYPHUS.

KLODNITZKY (N.). **Beobachtungen über Flecktyphus in Astrachan in den Jahren 1907-09.** [On Typhus in Astrachan in 1907-09.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1912. Dec. 30. Vol. 67. No. 5. pp. 338-354.

The author commences by giving a history of this disease in Russia and shows how the epidemics usually follow years of famine. During the years 1907 to 1909 large numbers of cases of both typhus and recurrent fever (*Sp. recurrentis*) were observed in the State of Astrachan and in many cases the author was able to study the course of the infection in detail.

The results of NICOLLE, COMTE and CONSEIL, and also RICKETTS and WILDER are confirmed as regards the transmission of the disease by ectoparasites, especially the body-louse; and by the application of suitable prophylactic measures typhus was almost eradicated from the State by the end of 1909.

Detailed clinical notes of a certain number of cases are given, including that of the author himself, who was infected whilst visiting a house containing typhus patients heavily infested with lice. In one case, that of a laboratory assistant, the patient was directly infected whilst assisting at the post mortem of a man dead from typhus. During the post mortem the assistant pricked his middle finger and after an incubation period of twelve days suffered from a typical attack of typhus. In the majority of cases the incubation period was about twelve days. Temperature charts are given of five of the cases, together with detailed clinical notes. It is interesting to note that in many cases of typhus the author observed changes in the nails, resembling those described by FEER in 1905 as occurring after scarlet fever. This consists of the development of a small fold or ridge at the bottom of the nail. As a result of the bacteriological examination of 70 cases the author was once able to isolate a small bacillus that also occurs in the stomachs of bugs that have fed on infected animals. This organism, named *Bacillus violentus*, was found to be agglutinated by the serum, diluted 1:2000, of a typhus patient. It was easily cultured on various media and was found to possess the most extraordinary virulence, for mice injected intraperitoneally with 0·000,000,001 cc. invariably died within twenty to thirty hours. Over 200 mice were used for these experiments and there can be no doubt of the pathogenic properties of this bacillus, which was also very fatal to rats, guinea-pigs, and rabbits.

The author does not express the definite view that this bacillus is the cause of typhus, but considering its agglutination by the serum of patients, it is considered worthy of further investigation and, at present, an examination of the complement fixation is in course of progress (see the article by RABINOWITSCH, p. 400).

E. Hindle.

BIRT (C.). **Typhus Fever.**—*Jl. R. Army Med. Corps.* 1912. Nov. Vol. 19. No. 5. pp. 521-529.

This paper consists of a summary of our present knowledge of typhus together with a consideration of the history of past epidemics, viewed in the light of the discovery of its transmission by means of body-lice. The author shows how, from this point of view, past epidemics can be explained and gives a very interesting historical resumé of the more important outbreaks of typhus.

Attention is called to the work of MOCZUTKOWSKI who was the first to show that the blood of a typhus patient was infective. In 1876 he inoculated himself with the blood of a patient taken on the tenth day of the fever and eighteen days later was prostrated with a severe attack of typhus. This first successful human experiment was not made known till 1900 and seems to have attracted little notice.

In conclusion the author points out that forty years ago MURCHISON indicated the correct prophylactic measures, which are summed up in the destruction of pediculi. A temperature of 160° F. to 175° F. is said to be sufficient to kill lice and their ova.

E. H.

PROPHYLAXIS.

CONSEIL (E.). **Résultats de la Prophylaxie du Typhus Exanthématique à Tunis de 1909 à 1912.**—*Bull. Soc. Path Exot.* 1912. Nov. Vol. 5. No. 9. pp. 744-747.

Since the year 1909 the war against typhus in Tunis has been based upon the knowledge that the disease was mainly, if not entirely, transmitted by the body-louse. In consequence, whenever a case of typhus was discovered in a house, not only were the clothes and bedding of the patient disinfected by passing through an oven, but also those of all the other members of the family. In addition the patient and also any persons that had occupied adjoining rooms to him, were taken to the public baths and all their ectoparasites carefully removed by washing, followed by an application of camphorated ointment. Any room occupied by the patient and also those adjoining it were also sterilized by means of sulphur. No prophylactic measures were taken against the excrement of the patient or the drinking water.

The author gives a table showing the number of cases in Tunis in each of the four years from 1909 to 1912. In 1909 there were 836 cases; in 1910, 148; in 1911, 180; and finally in 1912, only 22 cases. The disease is much more prevalent during the months of March to August than during the winter months.

In addition the author gives particulars of the result of the prophylactic measures in individual buildings which were known to be centres of infection and shows how it has been possible to eradicate the disease. In 1911 and 1912, all the cases remained isolated, showing how effectively the measures adopted prevented any spread of the infection.

[The excellent results obtained in Tunis lead one to hope that before long typhus will disappear from North Africa in the way that it has gone from Europe. In Africa its disappearance is being hastened by the adoption of efficient prophylactic measures based entirely on a knowledge of the mode of transmission of the disease by the louse.]

E. H.

SERUM DIAGNOSIS, &c.

RIZZUTI (G.) & SCORDO (F.). **Ricerche Batteriologiche e Sierodiagnostiche nel Tifo Esantematico.** [Bacteriological and Sero-diagnostic Researches on Typhus.]—*Malaria e Malat. d. Paesi Caldi.* 1912. Dec. Vol. 3. No. 12. pp. 321-331.
Recherches Bactériologiques et Serodiagnostiques à propos du Typhus Exanthématique.—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 778-779.

During the Italian campaign in Tripoli the authors have had the opportunity of examining some cases of typhus that occurred amongst the soldiers and also the natives of the country. After a short history of the previous work on the causal agent of typhus, they proceed to a description of fourteen cases in which the authors made a careful bacteriological examination of the patients.

Agglutination tests were tried with the following organisms: Eberth's bacillus, Paratyphoid A and B, *Micrococcus melitensis*, but in all cases the serum of the patients gave negative results.

The authors also attempted to culture an organism from the blood taken from patients on the second to the fourteenth day of the fever. Broth and agar were used as culture media, but uniformly negative results were obtained. In individual cases the cerebro-spinal fluid and spleen were also examined without finding any organisms. Accordingly, the authors consider that typhus is caused by an ultra-microscopic parasite and that the various organisms found in the blood by some investigators are probably the result of secondary infections.

E. H.

RABINOWITSCH (Marcus). **Ueber die Komplementbindung bei Flecktyphus durch den Wässrigen Extrakt aus dem Flecktyphuserreger.** [The Fixation of the Complement in Typhus by a Watery Extract of the Typhus Organism.]—*Deut. Med. Wochenschr.* 1912. Oct. 24. Vol. 38. No. 43. pp. 2018-2019.

During an epidemic of typhus in Kieff during the years 1908 and 1909, the author was able to examine the blood of 58 patients and the organs of 30 that died from the disease. In all cases the author was able to find "*Diplobacillus exanthematicus*" in the organs, and also in the blood circulation, both by cultural methods and microscopical examination. A further proof that this organism is the cause of typhus is afforded by agglutination tests and also by the serum reaction. The fixation of the complement by means of a watery extract of cultures of the "*Diplobacillus*" is described in the present article.

As antigen the author employed a watery extract of a 24 hour culture of the organism on glycerine serum. To this antigen was added varying amounts of typhus serum, inactivated by heating to 55° C. The haemolytic system was then added to the mixture and the whole kept for two hours in a thermostat. In this way the blood of twelve patients was examined and the following results obtained:—

Complete fixation of the complement takes place between the sera of patients taken only after the sixth day of the febrile attack, and extracts of the organism after it has been cultured at least one month, but not more than two months. The sera of healthy persons and also patients suffering from other diseases gave negative results. The sera of typhus patients taken at the commencement of the febrile attack and on the second and third days also shewed no fixation of the complement. Similarly the extract of fresh cultures of the organism obtained from the blood eight days previously gave negative results, even with the serum of the patient from whom the culture had been obtained. When large quantities of serum and antigen were employed, slight fixation of the complement was obtained with sera other than that from typhus patients, but was complete only in the case of the latter.

In spite of the strong evidence that Rabinowitsch brings forward in support of his view as to the causative relation of *Diplococcus exanthematicus* to typhus, it should be noted that many authors have entirely failed to find the organism in cases of this disease. KLODNITZKY (*see above*, p. 398) in particular, examined the blood of 70 patients without being able to find it and, therefore, for the present, the causative agent of typhus must be regarded as not thoroughly proved.

E. H.

ANDERSON (John F.) & GOLDBERGER (Joseph). **Natural and Induced Immunity to Typhus Fever.**—*Jl. of Infectious Diseases*. 1912. Nov. Vol. 11. No. 3. pp. 402-410.

After mentioning instances of transient or permanent natural immunity of human beings to certain infections, the authors proceed to discuss the results obtained by them in the inoculation of monkeys with typhus. Working with the New York and the Mexican virus, they found that out of 58 monkeys inoculated with doses of virulent typhus blood, thirteen did not become infected; of these, five did not become infected after a second inoculation, and two failed to react after three inoculations. While recognizing the possibility that in these cases viruses of different virulence may be a considerable factor the authors do not think it probable, as the strain employed had been propagated through 25 monkeys without showing any diminution in virulence. They consider therefore that instances of a transient or permanent natural immunity of the monkey to typhus are not uncommon.

The repeated inoculations of virulent blood, or blood serum, when not followed by a febrile reaction, confer no appreciable resistance. The failure of an animal to react to an immunity test cannot therefore, in the absence of a previous febrile reaction, be interpreted as indicating that it was protected (vaccinated) by the primary, apparently ineffective, inoculation.

In discussing the susceptibility of the monkey, the authors give tables showing the incubation period and length of the disease in a number of monkeys. Ninety-two out of 103 showed an incubation period of six to ten days, and the duration of the illness in

83 out of 102 monkeys was six to eleven days. A typical febrile reaction is always found to confer complete protection against subsequent infection, and the authors mention one case in which this immunity lasted for at least two years. This febrile attack, under experimental conditions, is considered to justify a diagnosis of typhus.

An atypical or poorly defined fever following an inoculation cannot, however, be interpreted as typhus unless it is followed by resistance to subsequent immunity tests,

E. H.

SCORDO (F.). **La Pressione Arteriosa nel Tifo Esantematico.** [Arterial Pressure in Typhus.]—*Malaria e Malat. d. Paesi Caldi.* 1912. Nov. Vol. 3. No. 11. pp. 289-307.

Employing the RIVA-ROCCI method the author has examined the changes in the arterial blood pressure of seven cases of typhus. The results were very inconstant, there being a rise of pressure in four cases and a fall in the remaining three. The author remarks that they seemed to depend mainly on the state of the patient, there being an increase in pressure when the patient was excitable and a decrease when he was unconscious or partly so. In spite of the few experiments it seems unlikely that this field of research will give any useful results in the case of typhus.

E. H.

POROCEPHALIASI

Sambon (Louis W.). Porocephaliasis in Man.—*Jl. Trop. Med. & Hyg.* 1912. Nov. 1. Vol. 15. No. 21. pp. 321-327; & Dec. 16. No. 24. pp. 371-374.

Reference is first made by the writer to articles in the *Journal of Tropical Medicine and Hygiene* (Jan. 15, July 15, and September 1, 1910) in which he described the two tongue worms or linguatulids *Porocephalus armillatus* and *Porocephalus moniliformis*, the former belonging to the Ethiopian the latter to the Oriental region. The larval forms of both of these species are known to occur in man within their respective distributional areas and a list of cases recorded in the literature up to date was given. [The adults of these parasites (Fig. A) inhabit the lungs, trachea and nasal cavities of pythons and other snakes, while the larval or nymphal forms, usually found spirally coiled within a cyst, (Fig. B) have been found in the liver, lungs, mesentery and mesenteric glands of man (*Pentastomum constrictum*) and in the same tissues of other animals lions, leopards, monkeys, cats rats and hedgehogs.*]

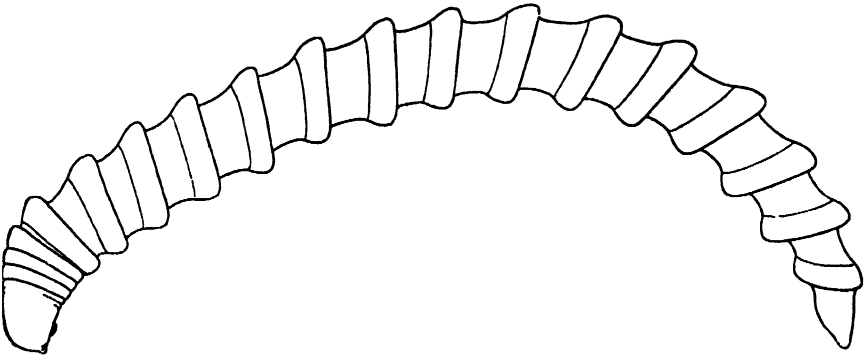

Fig. A.—*Porocephalus armillatus*, ♀. Natural size.

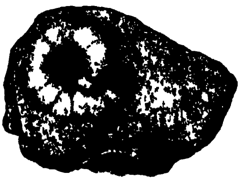

Fig. B.—Nymphal stage of *Porocephalus armillatus* in liver.

In the present paper (i.) the author mentions three more cases ascribed to *P. armillatus* which he did not mention before because they could not possibly have been due to this Ethiopian linguatulid. As two of these occurred in America he believes that the forms found may really have belonged to some species of linguatulid inhabiting the Neartic region—to *Porocephalus crotali* for example—so he gives a detailed description of this parasite. The adult forms of *P. crotali* inhabit the lungs of *Crotalus adamanteus*, *C. horridus*, *C. terrificus* and other rattlesnakes of the United States. The larval form described by DIESING in 1835 from the marine opossum (*Marmosa murina*) under the name of *Pentastoma subcylindricum* is probably the nymphal stage, but considerable confusion apparently exists between these different forms, at least three different species being confounded with *P. crotali.*

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* Figures A and B are reproduced from a paper by Sambon in the *Jl. of Trop. Med. & Hyg.* 1910. July 15. p. 213.

(ii.) In this paper another species of Porocephalus (*P. clavatus*) is described. Its geographical distribution is Central and South America. The adult forms are found in *Boa constrictor* Linn. the common boa and in *Boa imperator* Daud. the emperor boa, while the nymphal forms have been recovered from *Didelphys virginiana* Shaw. the Virginian opossum and in *Philander philander* the philander opossum. At one time the species was confounded with *P. crotali.* Sambon gives amongst other synonyms for it the name of *Pentastomum proboscideum* a form with which an interesting experiment was conducted by STILES (1891). In 1890 STILES in America, found several specimens of *Pentastomum proboscideum* = *Porocephalus clavatus* (according to Sambon) in the lung, trachea and body cavity of a recently imported *Boa constrictor.* He fed a young dog, a guinea pig, a rabbit, a dove and some white mice with the eggs of the linguatulid and got the following results. In the dog (70 days), the guinea pig (82 days), and the rabbit (83 days) after infection, all the larvae were found to have died off at a very early stage of development. Calcification had taken place in the cysts. In the dove no cysts developed as was expected. In the white mice the results were very striking. One of these rodents died 32 days after infection and at the autopsy, on opening the body cavity, Stiles noticed that the liver, kidneys, lungs, peritoneum and even the subcutaneous connective tissues were dotted with numerous spots the size of a pin's head. On closer investigation these spots proved to be the seats of the encysted pentastomes. Contrary to the experience of others no cysts were found in the muscular system. Some of the larvae enclosed by the connective tissue capsule had died at a very early stage of development. This Stiles terms "first stage." Others had attained a condition of development which (according to LEUCKART) is reached by *P. denticulatum* at the end of the eighth week, "second stage." On the forty-fifth day after infection two more mice died. They likewise contained a great number of larvae, all of which had proceeded further in their development than those of the first mouse, "third stage." On June 3, i.e., eighteen weeks and a half after infection, the last mouse was killed, and in it were found a great number of perfectly developed pentastome larvae, some free in the thoracic cavity, others encysted in the various organs, "fourth stage."

These agreed so thoroughly with the description given by LEUCKART of *P. subcylindricum* that STILES now regards as certain LEUCKART'S assumption that *P. subcylindricum* is the early form of *P. proboscideum*. Later, through LEUCKART's kindness he was able to compare his larvae with a specimen of *P. subcylindricum* found by NATTERER in the liver of a Didelphys (= *Marmosa murina*) in order to establish their identity.

Stiles also endeavoured to infect some European snakes (the common snake, *Tropidonotus natrix* and the common viper *Vipera berus*) by giving them the fully developed larvae from the mice in their food in the hope of obtaining the intermediate stages between the full grown larvae and the adult forms. In both kinds of snakes he recovered the larvae from their body cavity later. In one case they appeared to have grown in size, but in the others, they had either not developed any further, or had died.

G. C. LOW.

LOHLEIN (M.). **Beiträge zur Pathologie der Eingeborenen von Kamerun.** [Summary of the Results of 140 Autopsies in Duala, Cameroons, 1910 & 1911.]—*Beihefte z. Arch. f. Schiffs- u. Trop. Hyg.* 1912. Nov. Vol. 16. No. 9. 110 pp. [Porocephaliasis pp. 58-72.]

The author states that porocephalus larvae are very frequently found in the organs of Cameroon negroes, much more frequently than the literature of the subject would lead one to believe. He refers to SAMBON's paper on 'Porocephaliasis in man' (Jl. Trop. Med. & Hyg. 1910. July 15), in which at that time only about sixteen cases had been recorded in man, in about 70 years, and then narrates how SEIFFERT in 218 autopsies in coloured railway workers in the Cameroons had seen a similar infection seventeen times, i.e., in 7·8 per cent. Löhlein himself found a slightly higher percentage of infections in a series of 118 post mortems on negroes conducted by himself, ten being found with larvae, i.e., slightly over 8 per cent. BRODEN and RODHAIN (quoted from SAMBON) found two cases of porocephalus infection in Congo negroes out of forty post mortems, while of 31 monkeys they found nine (29 per cent.) infected with larvae.

The author follows SAMBON as regards nomenclature of the species and quotes freely from his papers. Anatomical details of the adults and nymphal forms are then given and the exact sites the latter were encountered in are detailed. As regards the effect these parasites produce on the health of the infected human subject opinions seem to vary. 'Most authorities, Löhlein included, seem to think they are harmless but in cases described by CHALMERS, WALDOW and RAEBIGER free wandering parasites were found and in the first observer's case probably were the cause of death. CHALMERS in describing his case stated that 'the presence of the parasite in the human body sets up inflammation of the lungs and the peritoneum, but it does not appear to irritate the alimentary canal or the liver. The disease appears to last some time before causing the death of the patient, for as far as he could determine the Mendi [Sierra Leone Negro] had been ill for a long time.'

In WALDOW's case, a native, 25 years of age, who died in the Cameroons with symptoms of meningitis, small cysts containing calcified porocephali were found in the liver beneath its peritoneal covering, others in the omentum, mesentery and pleura. In the transverse colon two living and free specimens were found, one within the lumen of the gut, the other attached to the serous covering.

In most cases however the presence of the porocephalus larvae is only detected accidentally at autopsy in cases dying of dysentery, pneumonia, malaria or other diseases. They do not appear to give rise to any special symptoms.

G. C. L.

RAT BITE DISEASE.

HATA (S.). **Salvarsantherapie der Rattenbisskrankheit in Japan.** [Salvarsan Treatment of Rat Bite.]—*Münchener Med. Wochenschr.* 1912. April 16. Vol. 59. No. 16. pp. 854-856.

The author refers to eight cases of rat bite disease treated by salvarsan in Japan. The patients were under the care of TANIGUCHI, KATAYAMA, SAKURANE and other Japanese doctors. Before giving details of these Hata gives a clinical description of the disease and recommends those who wish to study it to read the work of H. MIYAKE (*Mitt. a. d. Grenzgeb. d. Med. u. Chir.*, 1899. Vol. 5, No. 2. p. 231). Rat bite disease though common in Japan is little known in Europe. It develops only in a certain proportion of those bitten by rats. The incubation period varies from five weeks to two months, during which time the bite wound usually heals. The invasion is generally sudden with shivering or rigors, weakness, loss of appetite, headache and fever. In most cases the site of the bite now shows inflammatory changes with redness and painful swelling, which may spread to the surrounding tissues producing an oedematous swelling with vesicle formation and even necrosis. A lymphangitis spreading up to the lymphatic glands draining the area on which the bite is situated is also noticeable and later these glands swell and become sensitive to pressure.

The fever, even on the first day of the disease, is high, 39-40° C. and continues so for two or three days. After a profuse perspiration it falls to normal and with the fall the local swelling and inflammation of the lymphatics decrease in intensity.

After some days or after a week another attack of fever, associated with the same symptoms, appears, but is now in addition often associated with a characteristic erythema or a papular exanthem on different parts of the body. Further recurrences are common and the disease generally runs a prolonged course, the temperature often becoming irregular and intermittent. In most cases the tendon reflexes are increased at the commencement of the disease, later they are lost. The liver and spleen are not enlarged. In severe cases there are pains in the muscles and joints, sensory and motor disturbances, oedema of the whole extremity, or even of the whole body, albuminuria, delirium, lethargy and coma. The mortality is about ten per cent. Treatment up to the present time has mostly been symptomatic. Quinine, antipyrin, strychnine, pilocarpine, arsenic and atoxyl are among the drugs that have been tried.

The author then gives a short account of the eight cases treated by salvarsan. In most of those marked improvement followed the injection of the drug, the temperature falling, the inflammation subsiding, the skin eruptions disappearing and the lymphatic glands resolving. In one case the results were not so striking, but still some degree of improvement was noticeable. In two cases a relapse appeared. In those however the dose had only been 0·3 and 0·4 gram and the author believes that this was not large enough.

G. C. L.

CRUICKSHANK (Robert W.). **A Note on Rat-bite Fever, with Report and Temperature Chart of a Recent Case.**—*Brit. Med. Jl.* 1912. Nov. 23. pp. 1437-1439.

The note describes a case of rat-bite disease (Rattenbisskrankheit (German), Sokòshio (Japanese)) occurring in England. As far as the author knows, the only cases that have been reported in the British Isles are three by HORDER (1909-10) and one in 1895 by MIDDLETON of Glasgow. In America several cases have been noted and FRUGONI has recently reported one from Italy. The author believes that at least two others have been met with in Europe, one in France and one in Spain. MIYAKE's types and description of the disease are quoted. These are—

1. A febrile type with a marked eruption.
2. An afebrile type with nervous symptoms.
3. An abortive type.

MIYAKE states that the feverish phase is accompanied by an eruption of purplish spots. The wound heals during incubation, fever begins abruptly. The site of the bite becomes red and swollen, dropsy may appear and in some instances local gangrene is found. The onset is ushered in with chilliness, headache, marked weakness, fever, and an eruption of dusky coloured purple spots. Pain may be felt in the abdomen and diarrhoea may occur. The pulse is rapid and weak and a feeling of precordial pain and palpitation may be complained of. Delirium may be present. The disease runs a prolonged course and recurrences are common at varying intervals.

Cruickshank's case presented many of the features mentioned above, for example, the patient had a well marked rash and in all had fifteen febrile attacks. The longest period between the acme of attacks was eleven days, the shortest, which proved to be an abortive attack, was five days. The intermediary attacks showed eight, seven and six days' intervals. The disease apparently ceased suddenly with an abortive attack about the fifteenth week; the temperature was recorded for a month longer during which time it remained normal or subnormal. No later rash was noted. Convalescence was very slow, the patient suffering much from headaches. He was not able to get about much for six months after the bite but no distinctive manifestations occurred, though he still occasionally complained of giddiness and headache. Treatment by various drugs was tried, aspirin, phenacetin, quinine, sodium salicylate, sodium sulphocarbolate, etc., but none of these seemed to influence the course of the disease. The two first named were useful when headache was severe; later on tonics containing strychnine caused some improvement and appeared especially to benefit the heart.

G. C. L.

FRUGONI. (Cesare). (i) **Intorno al Primo Caso Diagnosticato in Italia di Sokodu (Rattenbisskrankheit).** [First Case of Rat Bite Disease diagnosed in Italy.]—*Rivista Critica di Clinica Medica.* 1911. Vol. 12. No. 50-51.

(ii) **Sokòdu (Rattenbisskrankheit).**—*Berliner Klin. Wochenschr.* 1912. No. 6.

Both papers describe the case of rat-bite disease seen by the author in Florence. This is the one referred to in CRUICKSHANK's paper (see above). In May 1908 the patient was bitten on the right thumb by a rat, two of the teeth of the rodent breaking off in the wound. The bite healed in three to four days. On the fifteenth day the site of the bite became red, swollen and painful and a small ulcer developed. Chilliness, vomiting, headache and fever then appeared, the temperature continuing high for fifteen days and then gradually sinking. Later, round red spots the size of a hen's egg, came out on the trunk and extremities. Later still an irregular fever set in with glandular swellings and for that the patient was treated in Prof. BANTI's clinique. In May 1909 a new skin eruption appeared and painful cramps in the calf were complained of. In September 1909 and May 1910 further relapses took place. In October 1910 exopthalmos with severe injection of the vessels and oedema of the conjunctiva was noted. The eyesight was good however and GUAITA found no functional or anatomical alterations of the disc. The patient then entered the medical clinic of Prof. GROCCO in Florence where the author had an opportunity of examining him. A blood count showed an eosinophilia of eight per cent., the faeces showed no ova of parasitic worms and Wasserman's reaction was negative. The pathological research of the blood gave no results. Frugoni describes the skin erythema which is so common an occurrence in rat-bite disease as an erythema exsudativum.

Points of special interest in his case were:—

1. The presence of an eosinophilia and
2. The complication of exopthalmos with acute retrocular cellulitis, the latter, according to the author, being analagous to the subcutaneous cellulitis which is the direct cause of the erythema exsudativum. These symptoms have not apparently been previously described. The patient was treated with atoxyl injections but relapsed again later.

In the part dealing with the historical description of the disease, Frugoni states that OGATA believes he has found a protozoal parasite in the blood, in the ulcers, in the skin eruptions and lymph glands of rat-bite cases. OGATA suggests that this may be a sporozoon belonging to the neosporodia and has called it the *Rattengiftsporozoon.* These researches have not been confirmed.

G. C. L.

SNAKE BITE.

Bannerman (W. B.). An Investigation into the Treatment of Snake-Bite by Permanganate of Potassium.—*Indian Med. Gaz.* 1912. Oct. Vol. 47. No. 10. pp. 381-382.

The treatment of snake-bite by potassium permanganate was first used by **Fayrer** in 1869, who found that the drug "did not seem to have any power to avert the lethal action of the poison." **Blyth** showed that when mixed *in vitro* with permanganate of potassium cobra venom became innocuous. In 1881 **Couny** and **Lacerda** performed certain experiments, showing that the lethal action of serpent's venom was destroyed when a 1 per cent. solution of the drug was injected into the tissues close to the place of bite. **Rogers** reported promising results from experiments on various animals. **Lamb** on the contrary conducted experiments which were not successful. The present investigation was instituted to obtain evidence as to the efficacy of the treatment *in vivo.*

In the first series of experiments natural conditions of biting were imitated as closely as possible. The test dose was that given by the actual bite of the cobra or daboia. The former, after having bitten, remains attached to its prey for an appreciable time, whilst the latter darts with incredible rapidity, and then releases its victim instantly. It occasionally fails altogether in its strike.

The results were as follows:—

"(1) A dog bitten by a cobra cannot be saved by the local application of powdered potassium permanganate rubbed in after free incision of the bitten place; nor by a similar application of a solution of the powder.

"(2) It may be saved by the immediate subcutaneous injection of 10 cc. of a 5 per cent. solution of the drug; but this solution is so strong as to act as an escharotic.

"(3) If this treatment be delayed for even two minutes, it loses its efficacy.

"(4) A dog bitten under natural conditions by a Russell's viper (Daboia) cannot be saved by the drug, however applied."

In the second series of experiments an attempt was made to inject the drug intravenously. It was found, however, that the intravenous injection of even 40 cc. of a half per cent. solution of potassium permanganate caused death from intravascular clotting; so the method had to be abandoned.

In the third series of experiments, the minimum lethal doses of cobra and daboia venom for dogs having been ascertained, solutions of the venom and the drug were introduced through the same hypodermic needle left in situ, so as to make certain that the poison and antidote came into contact. The results showed that even four times the amount which serves to neutralise cobra venom in a test tube will not with certainty prevent fatal poisoning in an animal which has received 10 minimum lethal doses, and that the same quantitative relations obtained when daboia venom was used. It was also found that crystals of potassium permanganate when rubbed into incisions in a dog's leg, produce extensive ulceration, and that, when combined with the local action of daboia venom, the crystals may even cause necrosis of the small bones.

In the fourth series of experiments the test dose given was less than 10 minimum lethal doses and the results obtained are given in a table.

Bannerman's final conclusions are as follows:—

"The conclusions as to the action of potassium permanganate powder on small doses of cobra venom injected just under the skin appear to be that this treatment is of some little use under these highly artificial conditions. It must be remembered, however, that a snake does not deposit its venom under the skin, but striking as it does with its fangs at right angles to the skin, the poison must usually be placed well below the fascia of the part, and therefore further removed from the applications of a chemical antidote.

"With regard to daboia venom injected just under the skin, the results are very similar to those obtained with the venom of the cobra, *i.e.*, that under such artificial conditions the treatment by free incision and rubbing with powder of potassium permanganate is of some little use. As a practical measure for employment after actual snake-bite it appears to be of no use whatever."

G. C. L.

ROGERS (Leonard). **The Present Position of the Permanganate Treatment of Snake-Bite.**—*Indian Med. Gaz.* 1912. Dec. Vol. 47. No. 12. pp. 467-469.

The author criticises BANNERMAN'S paper (see above) and hopes that the publication of the full report will not be further delayed, as on such an important matter full details of the experiments are necessary to allow its value, in relation to the very different conclusions arrived at by other workers, being estimated. For example, BANNERMAN'S statement that "even four times the amount which serves to neutralise cobra venom in a test tube will not with certainty prevent fatal poisoning in an animal which has received 10 minimal lethal doses, and that the same quantitative relations obtained when *daboia* venom was used," may at first sight appear to those unacquainted with the details of the subject as an argument against the value of potassium permanganate. Rogers on the other hand believes that it affords the strongest evidence in its favour and enters into explanatory details. In his own experiments made in 1903, cats were used and the method was signally successful in those animals. He points out that dogs are very unsuitable for experimenting on because they absorb cobra venom with great rapidity. Whatever deductions are to be drawn from these experiments on animals Rogers is certain that the method applied to the human subject has saved numerous valuable lives and gives a table of authenticated bites by cobras and other snakes, in which out of a total of 21 bitten 20 recovered.

Until a more efficient and practical method of treating snake-bite is discovered, he therefore believes that the permanganate method is the one to adopt.

G. C. L.

MAXWELL (J. Preston). **Snakes and Snakebite in the Fukien Province.**—*China Med. Jl.* 1912. July. Vol. 26. No. 4. pp. 243-245.

Snake bite, according to the author, is of comparatively rare occurrence in the Fukien Province of China, poisonous snakes being few in number. Of the latter the following have been verified:—*Bungarus candidus, Bungarus fasciatus, Naia tripudians, Lachesis mucrosquamatus, Lachesis gramineus, Ancistrodon acutus.*

A list of non-poisonous snakes is given, fifteen being named.

With regard to the poisonous snakes constitutional symptoms do not always follow their bite, in some instances serious local inflammation only resulting. [This is probably due to a slight bite with the injection of a small amount of venom.]

A fatal case in a man after the bite of a *Lachesis gramineus* (green bamboo snake) is narrated, and also two in children after the bite of a *Lachesis mucrosquamatus*; in both great sloughing of the limb took place. A third child bitten at the same time had its leg amputated in the upper third and recovered.

Probably other poisonous snakes occur in the province. The author thanks Lt. Col. ALCOCK and Dr. BOULENGER for help in the identification of the specimens.

G. C. L.

FITZSIMONS (F. W.). **The Snakes of South Africa: Their Venom and the Treatment of Snake Bite.** New Edition. 532 pp. With 1 coloured plate and about 200 text-figures. 1912. London: Longmans, Green & Co. Cape Town and Pretoria: T. Maskew Miller. [12*s*. 6*d*. net.]

An entertaining and instructive work. Written both from the point of view of the scientist and the field naturalist, its pages contain a wealth of material which certainly will prove of value to all students of this branch of zoology. Beyond a few isolated contributions to various journals, the author states in his preface that there is no current literature on the snakes of South Africa, their venom and the treatment of snake bite. His work will certainly now supply this.

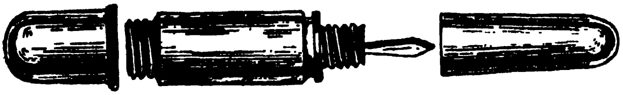
The typical venomous snakes of South Africa (illustrated by a coloured plate) he gives as follows:—

1. The Boomslang or Tree Snake (*Dispholidus typus*).
2. The Brown variety of Boomslang or Tree Snake (*Dispholidus typus*).
3. The Puff Adder—Pof Adder (*Bitis arietans*).
4. The Night Adder—Nacht Adder (*Causus rhombeatus*).
5. The Coral Snake—Koraal Slang (*Aspidelaps lubricus*).
6. The Hornsman or Horned Adder (*Bitis cornuta*).
7. The Black and Yellow Snake—Zwart en Geel Zee Slang (*Hydrus platurus*).
8. The Mamba or Tree Cobra, black variety (*Dendraspis angusticeps*).
9. The Mamba or Tree Cobra, green variety (*Dendraspis angusticeps*).
10. The Cape Cobra, yellow variety—Geel Kapell (*Naia flava*).
11. The Ringhals or Spitting Snake—Ringhals Slang (*Sepedon haemachates*).

All these, in addition to harmless non-poisonous snakes, egg eating snakes and others, are carefully described, both as regards their anatomy and general habits. The nomenclature adopted in the volume is according to the catalogue of snakes in the British Museum, compiled by the well known authority G. A. BOULENGER.

A systematic list of South African snakes for the use of museum curators and scientific students by the same authority is also given in Chapter XIII and should prove of great value.

In view of the recent pronouncement by Bannerman on potassium permanganate in the treatment of snake bite (see above), the author's remarks on this subject are of interest. He refers to the experiments of Lauder Brunton, Fayrer, Rogers, Lamb, Richards, Lacerda and others. In his own experience Fitzsimons has found that this drug destroys the poisonous properties of the venom of all South African snakes and that of venomous insects. He quotes the instance of a man who was bitten once by a full sized Berg Adder (*Bitis atropos*) and once by a Puff Adder (*Bitis arietans*) in whom ligature of the wound and injection of a solution of permanganate of potash seemed undoubtedly to prevent a fatal result. In further experiments he found that when the drug is rubbed into the free incisions made over the site of injection of snake venom or the direct bites of venomous snakes, recovery frequently takes place when the higher animals are experimented on. Success is in proportion to the quantity of poison injected, and the time which has elapsed between the application of the remedy and the time of the injection of the venom. If the potash is applied five minutes or more after the injection of the venom, it is unsuccessful and death always occurs. In one instance he mixed 50 times a fatal dose of cobra venom with a little permanganate and injected it without any poisonous effect. Judging from his experiments he concludes that if a person be bitten by a venomous snake and rubs permanganate of potash into the incisions made over the site of the punctures and applies a ligature within five minutes of the infliction of the bite, provided that proper secondary treatment is carried out, he will, in most instances, recover. Three important facts must be remembered however: (1) Permanganate when swallowed has no effect at all upon snake venom which has got into the blood. (2) If injected into a vein after symptoms of poisoning have set in it has no antidotal effect. (3) If injected or rubbed into the tissues at the site of the wound ten or more minutes after the infliction of the bite, it is of little or no use as an antidote.



Brunton's "First Aid" instrument. Actual size.

The author also gives brief instructions for the use of anti-venomous serum some of which are as follows:—

(1) Anti-venene is the serum of horses highly immunized with cobra and viper venoms (*Colubrine* and *Viperine*).

Its curative properties have been tested on animals against these venoms and found to be effective.

(2) In case of either cobra or viper bite when the patient is at hand and before symptons have set in, 25 to 30 c.c. of anti-venene should be injected under the skin into any part of the body where the skin is loose, such as in the region of the flanks. For preference inject into the loose tissues or folds of the abdomen at the sides between the last rib and pelvis.

(3) In a case when a patient is not seen until symptons of poisoning have set in, the same amount of serum should be given by injection direct into a vein.

(4) If serum has been injected under the skin, and if the patient seems to be developing alarming symptons, inject at least 25 c.c. into a vein.

(5) For intravenous injection, a vein of the forearm should be selected for preference. A local subcutaneous swelling appearing during the operation of injection shows that the needle is not in the vein, and a fresh attempt should be made to introduce it.

(6) If there be any albuminous deposits or flocculi in the bottle, the serum should be filtered through the corner of a clean linen pocket-handkerchief or a piece of clean rag into a wine-glass or other convenient receptacle previous to using it. This is not essential if injecting under the skin.

(7) The serum syringe should be perfectly clean. The best plan is to boil it in water to which some borax has been added.

If any weak antiseptic such as boracic acid or permanganate in solution be at hand, wash the site of the proposed injection with it. If no antiseptic is to be had, then rub the spot clean.

(8) An albuminous precipitate in the bottle does not indicate contamination and would be quite harmless if given subcutaneously.

(9) The bottles of serum should be kept in the dark, and in the coolest place in the house. Heat and light are the two chief causes in bringing about a deterioration in the strength of the antitoxic properties of the serum.

(10) When kept in a dark and cool place, the serum loses very little of its antitoxic properties in a year—probably not more than five per cent. even if as much.

(11) Serum injected in excess does no harm. Occasionally what is known as serum sickness (anaphylaxis) supervenes, but this is slight.

The book is handsomely illustrated with many excellent photographs. The obtaining of these must have cost the author much patience and labour.

An illustrated booklet by the same author on "Snake Bite and its Scientific Treatment" has also been received.

G. C. L.

CELL INCLUSIONS.

Schilling-Torgau (V.). **Concerning the Origin and Significance of Leishman's Chrome-Cells in Blackwater Fever (The Basophile Granular Leucocyte of Ehrlich).**—*Jl. Trop. Med. & Hyg.* 1912. Dec. 16. Vol. 15. No. 24. pp. 369-370.

The author first draws attention to the so-called chrome cells described by Leishman and states that Thomson has recognised these as degenerated mast cells. These basophile-granular leucocytes are rare, hardly ever being found in the normal blood in numbers exceeding 0·5 to 1 per cent. This percentage is raised in leukaemia or polycythaemia and the author has drawn attention to their comparative frequency (up to 3 per cent.) in beriberi. They are also found in the blood of natives and inhabitants of tropical countries. The true form of the basophile leucocyte is seldom observed by the Romanowsky method, this apparently being due to the process of fixing and subsequent treatment. For demonstrating them the new Giemsa-acetone quick staining process is recommended. The technique for this is as follows:—

> Giemsa solution and pure acetone are mixed in equal proportions, and 15 drops of the mixture are placed on an air-dried preparation not more than 48 hours old at the bottom of a carefully sterilized Petri dish. After one minute pour 15 cc. of distilled water into the dish, mix, leave for 5 minutes, wash and then dry in the usual manner.

As regards the cell inclusions described in blackwater fever by Leishman, the author inclines to the view held by Wenyon that the larger of these are really the remains of normoblastic nuclei, the smaller being the well known plasmosomes of Wolf and Ferrata. The latter bodies, he states, are common in the blood of malarial patients. The immature basophile granules, often referred to as the so-called promyelocytes, the primary stages of the real myelocytes, possess a certain resemblance to the inclusions of the chlamydozoa, especially in their first stages inside the cell. Schilling-Torgau found these cells, where aggravated symptoms of blackwater fever and malaria were present, on several occasions, but in no case did he see any bodies which in his opinion were chlamydozoa.

G. C. L.

Castellani (Aldo). **Note on certain Cell Inclusions.**—*Jl. Trop. Med. & Hyg.* 1912. Dec. 2. Vol. 15. No. 23. pp. 354-358.

In this paper various kinds of cell inclusions derived from different pathological lesions are described. The author divides these up under two headings:—

(1) Those of type A or chlamydozoa-like.
(2) Those of type B.

Those of type A were met with in a case of chronic urethritis of non-gonorrhoeic origin, in the epithelial cells of the conjunctiva, and in the epithelial cells of the oral mucosa.

The cell inclusions of type B were quite different from those described under the term type A or chlamydozoa-like. The author called attention to them in 1905 in some of his papers on yaws. They are of fairly frequent occurrence and may be found in epithelial cells as well as in leucocytes; they may be (1) in the cytoplasm of the cells, or (2) intranuclear. These inclusions take a blue colour with Giemsa's stain, sometimes of a pale tinge, sometimes of a deep hue. They are round, oval, or pear-shaped, the maximum diameter varying from two to five or six microns; they are occasionally vacuolated and almost constantly present some dots of chromatin. As regards the nature of these inclusions; they are not in the author's opinion parasitic, as they are found in diseases of most different etiological nature, such as yaws; psoriasis, acne vulgaris, lichen ruber, etc. They cannot be confused with Ferrata plasmosomes or Kurloff bodies, the former being metachromatic and the latter staining purple or red, nor with the different bodies recently described by LEISHMAN in blackwater fever and by LOW in other diseases. Probably they result from degenerated erythrocytes and although the chromatin granules certainly resemble parasitic granules, nevertheless the fact just mentioned that they have been seen in non-protozoal diseases, such as acne vulgaris, disposes of the parasitic theory.

The author's conclusions are as follows:—

"(1) Inclusions of 'type A or chlamydozoa-like' have been observed by me in epithelial cells of the urethra, of the conjunctiva, and of the oral mucosa. I consider them, with the possible exception of those found in the conjunctival mucosa, as merely products of cellular degeneration.

"(2) Cell inclusions of 'type B,' to which I called attention in 1905, oval or roundish bodies, staining by Giemsa or Leishman pale or deep blue, occasionally vacuolated and generally presenting some chromatin dots, are found in yaws, psoriasis, and many other pathological conditions in the leucocytes and epithelial cells. I do not consider them to be of parasitic nature.

"(3) Oval or roundish free bodies, varying greatly in size, are often seen in films from yaws, psoriasis, and other pathological conditions, staining blue and presenting numerous granules which take the chromatin stain deeply. These bodies are degenerated basophile erythrocytes presenting chromatin dots. These blue, chromatin dotted bodies, or fragments of these bodies, are engulfed by the leucocytes and other phagocytic cells, and most probably appear in these cells as inclusions of type B.

"(4) The true nature of the chromatin dots in the free blue staining bodies (degenerated basophile red cells) is unknown, but I adhere to the opinion that they are not parasitic. They are quite different from the more usual granules found in red blood cells. They take the chromatin stain deeply, and closely resemble, in my opinion, the Jolly's granules, though in contrast to these they are present in large numbers, and are always found in basophile cells."

G. C. L.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. I.] 1913. [No. 8.

FILARIASIS.

FOLEY (H.). **Études Morphologiques sur les Microfilaires à Gaine** (*Mf. Bancrofti* **et** *Mf. Diurna*). **Observations faites chez les Tirailleurs Sénégalais d'Algérie.**—*Ann. Inst. Pasteur.* 1913. Jan. Vol. 27. No. 1. pp. 50-68.

The material from which these studies were made was obtained from a detachment of Senegalese soldiers quartered in Algiers. Many of these were filariated, three species of filaria—*F. bancrofti*, *F. loa*, and *F. perstans*—being met with. Of the former two the first was much the more frequent. At the commencement of his studies the author found some difficulty in distinguishing between the embryos of *F. bancrofti* and *F. loa* (*diurna*), but after examining the collections at the Pasteur Institute in Paris he found that this was a comparatively easy matter. The paper is devoted to a detailed account of the differences between these two filariae and, though mainly confirmatory of previous work, nevertheless contains much interesting information. For the research the larval filariae were examined in three ways—(1) In the fresh state; (2) After vital staining, and (3) In dried and stained films.

Morphological differences are not so marked in the fresh state but, according to Foley, the embryos of *F. loa* are shorter and somewhat broader than those of *F. bancrofti*. The following table shows this—

Measurements in the fresh state in microns.

—	*F. bancrofti* embryos.	*F. loa* (*diurna*) embryos.
Total length (without sheath)	280 to 295	260 to 275
Distance of V spot from extremity of head	89 to 95	85 to 95
Distance of tail spot from extremity of tail.	53 to 55	55 to 57
Greatest breadth	5·50 to 5·75	5·75 to 6·50

For vital staining weak solutions of methylene blue and neutral red were used. The penetration of the stain in *F. bancrofti* takes

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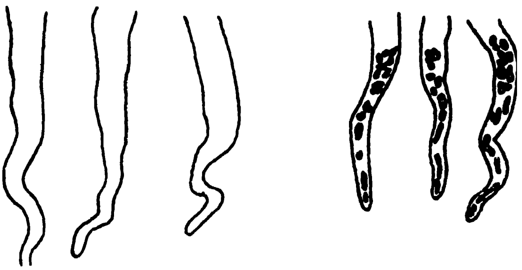
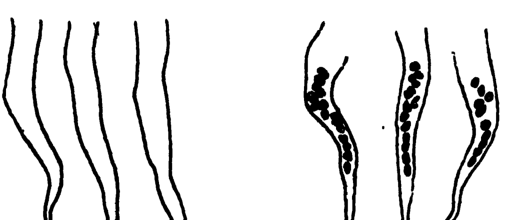
place slowly by the narrow pores (*pores étroits*); the spots (V and tail) dó not appear clearly; the colour diffuses uniformly over the whole surface of the body and impregnates the cells of the subcuticula (*Matrixzellen der Subcuticula* of RODENWALDT). In *F. loa* on the other hand, as PENEL has specially noted, the colour penetrates by the pores of the V and tail spots in a constant manner. In a short time the V spot shows up very clearly and from there the stain diffuses into the body of the embryo. The cells of the subcuticula are much less visible. Even after all the body is stained both V and tail spots still show up distinctly.

In dried and stained films characteristic differences between the two embryos are obtained. Methylene blue, haemalum and Giemsa's solution were the stains employed. With the latter the sheath in *F. loa* remains uncoloured while in *F. bancrofti* it takes on a carmine tint. Again, the central body or viscus (*corps central*) is not apparent in the former while in the latter it appears as a continuous filament staining a bright violet red. In *F. loa* the central column of cells occupies the whole thickness of the body; they stain a pure blue colour. In *F. bancrofti* the cells form a narrow column which leaves a clear space on each side of it, Giemsa staining them a violet blue.

The tail of *F. loa* generally shows a series of sharp curves at its extremity, producing the appearance of a corkscrew. The terminal cells are often much elongated and with more or less considerable intervals occupy the complete length of the body. This is an absolute differential characteristic. [See also paper by FÜLLEBORN in this *Bulletin*, No. 2, p. 87]. In *F. bancrofti*, on the other hand, the tail is more drawn out, is more sharply pointed, and the terminal cells fall short of the end of the body by a distinct interval. [The following diagrams taken from the paper demonstrate these points].



Caudal extremities of *F. loa* (*diurna*) embryos.



Caudal extremities of *F. bancrofti* embryos.

Two tables of measurements are given, these showing the total length of stained specimens and also the distances of the various spots in terms of percentages of the whole length. [Some of the terms used are different from those employed in the English nomenclature. For example the *Tache oblique* is not spoken of as a spot in England but is known as "the break in the continuity of the cells." The V spot in the text is also spoken of as corresponding to "*l'interruption de la colonne nucléaire.*" This is not only confusing, but is, strictly speaking, incorrect as there is no complete break in the cells at this point. This term if used at all should correspond to the *Tache oblique*].

After some remarks on the periodicity of the two embryos, in which it is stated that this feature is more constant in *F. loa* than in *F. bancrofti*, the author sums up his conclusions in the following table:

Stained by Giemsa's method.	*F. bancrofti* embryos.	*F. loa* (*diurna*) embryos.
Sheath	**Coloured ... ...**	**Uncoloured.**
Cells	**Violet blue ... ...**	**Pure blue.**
Cells of the cephalic extremity.	**Sharply terminated in a straight row.**	**More or less irregularly scattered.**
Cells of the body ...	**Small, rounded, easy to count, forming a column narrower than body of embryo.**	**Larger, less regular, fused at places, occupying the whole thickness of embryo.**
Cells of the caudal extremity.	**Not reaching the point of tail.**	**Occupy the whole length of the caudal extremity.**
Central viscus ...	**Well coloured ... ...**	**Not apparent.**

The paper is illustrated by eight black and white sketches and one coloured plate. There are also six tables.

G. C. Low.

OUZILLEAU (F.). **Les Filaires humaines de la Région du Mbomou (Afrique équatoriale française). Pathogénie de l'Éléphantiasis de cette Région. Rôle de la** *Filaria volvulus.—Bull. Soc. Path. Exot.* 1913. Jan. Vol. 7. No. 1. pp. 80-88.

In the region of Mbomu, one of the two head waters of the Ubangi, the proportion of elephantiasis in different districts varies from 0·3 to 3 per cent. The different forms comprise elephantiasis of the scrotum and penis, labia majora and minora, and the inferior extremities, and lymph scrotum and adenolymphocele.

The human filariae found, according to the author, are of three species, *Filaria perstans*, *Filaria loa* and *Filaria volvulus*. *Filaria bancrofti* does not exist, or at least was never seen by the author in 1,500 day blood examinations, nor in 400 night ones. The endemic index of *F. perstans* is 64 per cent., in natives above the age of ten. The index of *F. loa* is much less, 16 per cent. These two parasites are frequently found in the same blood and the patients may suffer at the same time from the cysts of *F. volvulus*, though it would appear that an infection by the latter exercises an unfavourable influence on the two former. *F. volvulus* seems to be very common. The cysts in which this parasite lives are generally superficial and situated under the skin which is movable over them. Adhesions, however, often bind them to the surrounding tissues or to the muscles and often even to the bones. They are generally very apparent and are almost always (80 per cent.) situated on the lateral aspects of the thorax. Sometimes they are very large, the size of an apple, and then are apparent at a glance in the semi-naked natives. They vary considerably, however, in volume, some being the size of a pigeon's egg or much smaller. In the other 20 per cent. Ouzilleau has encountered them on the osseous surfaces, or over the joints in contact with the skin, in situations such as the iliac crest, the great trochanter, knee joints, the olecranon and the frontal, parietal, and occipital regions of the head. In addition they have been found in the inner parts of the inguinal folds, over the symphysis pubis and along the cord, that is, in areas where they can easily be confused with lymphatic glands. It is further stated that *F. volvulus* embryos can be found in the blood but that this is rare. In some 200 blood examinations the author believes he found them once. The patient, a female, was suffering from bronchitis and had a *Filaria volvulus* cyst on the thorax. The blood, liquid from the cyst, and juice from the inguinal glands all showed micro-filariae in large numbers. [Measurements and descriptions of these are wanting; therefore there is no proof that those from the blood and glands were *volvulus* embryos]. According to the author similar embryos are very often found in the enlarged gland masses (*masses ganglionnaires*) of the crural region and in the lymphatic network of the inguinal crural area.

A suggestion is put forward that elephantiasis, in the district of Mbomu, is due to the *Filaria volvulus*. This is based on the fact that in every case of this disease seen by the author *Filaria volvulus* cysts were present and that in all of them micro-filariae were found in the inguinal glands.

[Many of the statements contained in this paper require confirmation. The fact of embryo filariae being found in the blood and in the enlarged groin glands points to their being the embryos of *F. bancrofti* and not of *F. volvulus*. Further the geographical range of elephantiasis does not correspond with that of *F. volvulus* and it is difficult to understand how a parasite lying in a cyst in the connective tissues could obstruct the lymphatics and produce such a train of symptoms].

G. C. L.

Low (George C.). **The Life of Filarial Embryos outside the Body.**—*Jl. Trop. Med. & Hyg.* 1912. Nov. 15. Vol. 15. No. 22. pp. 338-339.

The author criticises Wellman and Johns' paper on "Artificial Culture of Filarial Embryos" (*Jl. Amer. Med. Assoc.* 1912.

Oct. 26. Vol. 59. No. 17 and this *Bulletin* Vol. 1, No. 2, p. 91). He suggests that the increase of length of the embryos is possibly similar to that described by FÜLLEBORN and others when these forms have been inoculated into uninfected dogs. In any case the suggestion that the increased length of the embryos corresponds to their limit of development in the digestive tract of the mosquito is untenable because the embryos migrate immediately from the stomach to the Malpighian tubes.

G. C. L.

ELEPHANTIASIS.

THOMPSON (H. Gordon). **Surgical Work in South China.**—*Far Eastern Assoc. Trop. Med.: Trans. Second Biennial Congress held at Hong Kong.* 1912. pp. 149-157. With 4 plates.

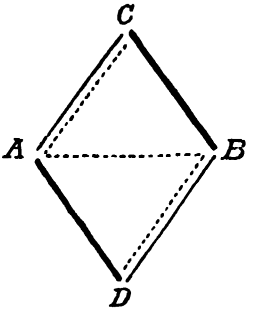
In this paper the author describes a modified operation for elephantiasis of the scrotum. He refers to a paper by BALDWIN (*Brit. Med. Jl.* 1910. Feb. 26. pp. 495-496) where the statement was made that in practically all cases of lymph scrotum the inner lining of the prepuce, which is really the tunnel leading down to the glans penis, consisted of a collar of healthy skin. BALDWIN therefore advocated the slitting up of this tunnel, in which the glans penis is to be found, and suggested the use of the healthy collar of skin to help to clothe the new penis.

Thompson has found this an excellent suggestion, but instead of slitting up the tunnel he now dissects out the penis with the inner surface of the prepuce intact and separates them from the rest of the affected tissue. Then after the usual flaps have been made, the testicles dissected out and the main mass of the scrotum removed, he turns back this collar of the inner skin of the prepuce without slitting it and generally finds that it is sufficient to clothe the penis for over an inch from the base of the glans. By not slitting it or damaging it in any way its vitality is unimpaired and if even a little tight at first it rapidly stretches and unites with the lateral flaps. The result is a penis covered with smooth healthy skin instead of one imbedded in the hairy skin of the scrotum.

G. C. L.

ROSANOW (W. N.). **Lymphangioplastik bei Elephantiasis.** [Lymphangioplasty in Elephantiasis.]—*Arch. f. Klinische Chirurgie.* 1912. Oct. Vol. 99. No. 3. pp. 645-655. With 4 text-figures.

Another operation for elephantiasis, a combination and modification of the method of LANZ and OPPEL, is here described. All these operations aim at the formation of an anastamosis between the superficial and deep lymphatics. [Compare also the operation devised by KONDOLEON. See this *Bulletin* No. 2, p. 93.] In the present instance rhomboidal areas of skin were removed from the thigh and the calf of a patient suffering from elephantiasis. These measured fifteen centimetres in the short diameter for the former, eleven for the latter. The subcutaneous tissues and aponeurosis were next cut through along the whole length of the short diagonal of the rhombus (line A. B.) and then along each



lateral side line down to the muscles (lines A. C., B. D.). Two triangular flaps were thus produced and each, after dissecting out, was then turned in into a cleft between the layers of the muscles adjoining, the vastus externus muscle for the thigh, the gastrocnemius for the calf, the fibres being separated for the purpose by means of a blunt instrument. The flaps were then united by catgut stitches to the muscles and periosteum, thus fixing them securely. After this the skin was drawn together and sutured along the long diameter of the diamond, compression thus being exerted upon the lymphatics below. The results according to Rosanow were very good, the patient being restored to a more or less active life. Photographs of the condition before and after operation are given. These show an improvement but not a cure.

G. C. L.

KONDOLÉON (Emm.). **Die chirurgische Behandlung der elefantiastischen Oedeme durch eine neue Methode der Lymphableitung.** [The Surgical Treatment of Elephantoid Oedema by a New Method of Lymph Drainage.]—*Münch. Med. Wochenschr.* 1912. Dec. 10. Vol. 59. No. 50. pp. 2726-2729.

The author's operation has already been described (see this *Bulletin*, No. 2, p. 93). The method consists of making a broad communication between the subcutaneous tissues and the muscles. This is accomplished by removing long strips of the thickened deep fascia along both sides of the affected limb.

G. C. L.

DRACONTIASIS.

WURTZ & SOREL. **Note sur la Durée de l'Incubation du Ver de Guinée.**—*Rev. de Méd. et d'Hyg. Trop.* 1912. Vol. 9. No. 2. pp. 123-124.

Most authorities estimate the duration of the incubation of guinea worm at about twelve months. MANSON in two cases definitely noted the lapse of one year between exposure to infection and the appearance of the worm. POWELL in eight cases of simultaneous exposure found that the incubation period varied from 345 to 435 days. In March 1911 the authors paid a visit of barely three hours to a village in the forest of the Ivory Coast where they noticed many cases of dracontiasis. 260 days later two of their servants were found to be infected both in the arm and foot. At the time of visiting the village they had worn European shoes, socks and drawers. They did not enter the stream from which the village obtained its water; but drank a great quantity of it. It appears, therefore, that infection can only have resulted from the ingestion of this impure water.

H. M. Hanschell.

FILARIASIS IN ANIMALS.

MITTER (S. N.). *Filaria immitis* **in Calcutta.**—*Bull. Soc. Path. Exot.* 1912. Nov. Vol. 5. No. 9. pp. 731-733.

The author refers to a paper of his own on cutaneous filariasis of dogs in Calcutta. Filarial embryos were present in the blood from the pustules. NEUMANN, commenting on this paper, stated that these embryos were not those of *Filaria immitis* and that this parasite had not been recorded from Calcutta.

Mitter now shows that it does occur there. In two dogs adult parasites were found at the autopsy in the right ventricle, in others in the right auricle. All the dogs died naturally after having exhibited marked clinical symptoms. Two were imported English fox-terriers, one a fox-terrier born and bred in the country, the fourth a cross-bred bull dog.

RAILLIET and HENRY, who joined in the discussion on Mitter's paper, stated that GANGULY (*Rev. vétér.* 1912. pp. 675-676) had also noted *Filaria* (*Dirofilaria*) *immitis* on three occasions in dogs in Calcutta. They however, like NEUMANN, do not consider that this filaria has any connection with verminous dermatitis. The embryos found by Mitter in the pustules and in the blood measured 460μ in length, a much greater measurement than the embryos of *Dirofilaria immitis*, which only attain to 285 to 295μ, or the embryos of *Filaria* (*Acanthocheilonema*) *recondita* and *A. dracunculoides* which are still smaller, 195 to 230μ. They lie between those of the *Dirofilaria repens* (300 to 360μ) and *Acanthocheilonema grassii* (567μ), but as the latter never circulate in the blood RAILLIET and HENRY incline to the opinion that Mitter's embryos are after all only examples of the former. A somewhat similar case observed by BONVICINI was definitely determined by the same authors to have been due to that species.

G. C. L.

BERNARD (P. Noël) & BAUCHE (J.). **Conditions de Propagation de la Filariose sous-cutanée du Chien.** *Stegomyia fasciata* **Hôte Intermédiare de** *Dirofilaria repens.*—*Bull. Soc. Path. Exot.* 1913. Jan. Vol. 7. No. 1. pp. 89-99.

In a previous paper (see this *Bulletin* No. 2, p. 95) the authors described a series of animal filariae from Annam. They now state that in the region of Hué (Annam) subcutaneous filariasis of dogs (*Dirofilaria repens*) is very common, while vascular filariasis (*Dirofilaria immitis*) is rare. In 400 blood examinations the latter was not diagnosed once, and at the autopsies of

25 filariated dogs a slight infection was only seen twice (four adults in the heart). In the present paper the life history of the extracorporeal phase of *Dirofilaria repens* is worked out in *Stegomyia fasciata* vel *calopus*. This takes place in the Malpighian tubes in a similar manner to that described by GRASSI and NOE, LOW, BANCROFT and others for the embryos of *Dirofilaria immitis*. The three former observers, working in Italy, found that the development took place in the Malpighian tubes of *Anopheles maculipennis*, while the latter, in Australia, found the same changes in *Culex fatigans*. That a development on such lines should take place for the embryos of *D. repens* in *Stegomyia fasciata* is therefore quite in keeping with the metamorphosis of the filariae in general. At suitable temperatures the development takes nine days for completion, forms then being found in the proboscis. If the weather is colder fifteen days or more may be required. The authors think that the mosquito phase in nature most likely occurs in the hot damp weather prevailing between April and August, and that that is the time when fresh dogs become infected. Some interesting observations are also detailed of the probable time required for the larval forms to reach the adult stage in the body of the dog.

A diagram of the developing forms is given. [These show changes very similar to those undergone by *F. bancrofti* and *D. immitis* in their respective mosquito hosts.]

G. C. L.

SAISAWA. **Untersuchungen über Hundefilarien.** [Researches on Dog Filariae.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1912. Nov. 9. Vol. 67. No. 1-2. pp. 68-75. With 2 plates.

The object of the author's researches was as follows:—

(1) To confirm the work of RODENWALDT and FÜLLEBORN on the minute anatomy of the dog filariae.

(2) To confirm for the same species the constancy of the anatomical fixed points in relationship to the total length of the embryo, and to show the consequent value of this for differential diagnosis.

(3) To prove how the cells observed in the embryos in the circulating blood undergo further development when taken up by the mosquito and especially to determine whether the G cells of RODENWALDT belong to the genital system or not.

RODENWALDT and FÜLLEBORN's work was confirmed in detail while the conclusion reached about the G cells was that they had nothing to do with the genital system.

The article is illustrated by two plates, one coloured, and many tables of measurements are given.

G. C. L.

WIRTH (D.). **Filariosen bei einheimischen Pferden.** [Filariasis in European Horses.]—*Zeits. f. Infektionskrankht., Parasit. Krankh., u. Hyg. d. Haustiere.* 1912. Oct. Vol. 12. No. 3. pp. 295-298.

Writing from the Veterinary College in Vienna Wirth describes four cases in which filarial embryos (microfilariae) were found in the blood of indigenous horses. Probably these were the embryos of *Filaria papillosa* (*Filaria equina*) but they seemed to differ in some respects as regards their staining reactions from embryos extracted directly from a female *Filaria papillosa.* Subcutaneous injections of atoxyl were given, with apparently good results.

G. C. L.

Pricolo (Antonio). **Larves de Filaires dans le Sang de Chameaux Tunisiens et de l'Erythrée.**—*Centralbl. f. Bakt.* 1. Abt., Orig. 1913. Jan. 11. Vol. 67. No. 6. pp. 478-479.

A description of the embryos is given. Some of the camels from which they were recovered were in perfect health, while others were extremely emaciated. One camel died without any cause being discovered. As a rule only one or two parasites were found in each preparation but in one twenty were seen.

The head of the embryo is rounded with a bright spot at the extremity; the tail terminates in a point. The length is given as 298μ, the breadth as $6{\cdot}2\mu$. Locomotion is very slight in ordinary wet preparations. [It is not stated if adults were looked for in camels that died and the description of the embryos themselves is so meagre that little can be made out from it.]

G. C. L.

Erratum.

Bulletin No. 2. (November 30, 1912.) p. 87. Lines 11 and 12 from top. " These glands were not hard as a rule, but formed soft masses (varicose groin glands) " should read " These glands were not soft but formed hard masses (*Drüsenpakete*)."

Dr. Fülleborn points out in a letter that the words *harte* and *weiche* were accidentally transposed in the German original.

*HELMINTHIASIS.

SCHISTOSOMIASIS.

NELSON (W. Horner). **Notes on Three Cases of Bilharzia Haematobia.**—*Australasian Med. Gaz.* 1912. Nov. 9. Vol. 32. No. 19. pp. 482-483.

Two of the three cases must have acquired the infection in Australia, for they had never been out of that country. The disease has therefore been introduced into Australia. One of the cases, a woman, lived at a timber mill, where an ex-soldier from the Transvaal, infected with bilharzia, was employed. She must have contracted the disease from him in some way or other. There were no bathing facilities; water for the mill was pumped from a place over a hill a mile away. Rain water was used for drinking. The ex-soldier had to micturate almost every half hour and he may have infected the bread he handled with fingers soiled with urine. The other indigenous case was a West Australian male, 21 years old. He lived twelve miles away, the contour of the country making it impossible for drainage to come from the mill. More than a year before the onset of his symptoms he had been at the mill for a period of two weeks. He was a platelayer and may have got his infection from the flushings of a lavatory car used by an infected person. The Central Board of Health has now made such cases notifiable; and it will soon be ascertained whether the disease is widespread or not.

H. M. Hanschell.

BOUET (G.) & ROUBAUD (E.). **Bilharziose au Dahomey et en Haute-Casamance. Quelques Observations Biologiques sur le Miracidium Bilharzien.**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 837-842.

The authors state that the data collected by them in Dahomey complete the numerous records of bilharziasis in the Soudan, Senegal and Guinea. The disease is common in lower and middle Dahomey. Terminal spined ova are frequently found in the urine of patients of various ages, who come under observation for other maladies. Vesical bilharziasis with blood-stained urine is not however uncommon. The authors give details of cases where attacks of dysentery with terminal spined ova in the faeces (never any lateral spined ova) followed on or coincided with the passage of blood stained urine containing terminal spined ova. In one such case the dysentery had disappeared and two years later the inguinal and femoral glands became enlarged, and there was epididymitis, all without apparent cause. It is suggested that this may have been due to the passage of the worms from the portal system into the lymphatics of the regions affected. A large proportion of children are infected but usually the infection disappears on reaching adult age. The authors experimented with ova (terminal spined) obtained from the faeces and urine of a patient.

*** During Dr. LEIPER's absence in West Africa this Section is being undertaken by Dr. H. M. HANSCHELL.**

1. *Preservation of embryos in urine.*—Ova in urine, kept in that medium for 12 to 20 hours at 23° to 25° C., set free motile miracidia when placed in water. This was the longest period of resistance of the ova in pure urine.

2. *Preservation of embryos on damp sand.*—Fragments of clot containing ova were divided into two lots. One lot was placed in pure water; the embryos emerged from the eggs in less than one hour. The other lot was placed on fine sand, slightly moistened. These ova did not set free their contained embryos until placed in contact with pure water 12, 24, or 30 hours later.

Eggs were placed on a little bed of sand, the periphery of which was sucking in water; 30 hours afterwards living miracidia were found in the water surrounding the bed of sand.

This property possessed by the embryos, of keeping alive inside the egg on damp sand for more than a day, forms an important biological phenomenon. Eggs may be deposited, in the act of micturition, on damp soil in the neighbourhood of sheets of water, and the embryos, set free from them by the first shower of rain occurring within 30 hours, may reach the water either mechanically, by being washed there, or by their own efforts.

3. *Non-resistance to drying.*—Conor's findings are confirmed. Eggs dried for a few moments, either naked or covered up in clot, do not set free their embryos. Miracidia exposed to drying for barely a few minutes do not revive when placed in water.

4. *Action of heat.*—Conor shewed that the bilharzia miracidia of Tunisia remained alive, and active at 45° C. and only died quickly after 50° C. was reached. Their optimum temperature appeared to be between 30° and 40° C.

The authors' experiments with the embryos in Casamance shewed that after 41° C. they were barely alive, and that they died in less than five minutes at 45° C. At 41° C. many died at the end of fifteen minutes, a few lived on for one and a quarter hours, contracting up into a ball and becoming very sluggish. When the temperature was lowered a few revived. The Casamance miracidia appear to have an optimum temperature of 30° to 35° C. According to Conor the presence of springs of warm water, with temperature sometimes high (42° to 45° C. at Gabès) determines the distribution of bilharziasis in Tunisia. There would appear to be in that country a geographical race of Schistosomum, characterised by the high degree of resistance to heat possessed by its embryos.

5. *Action of Hydrochloric Acid and Soap.*—Like Conor, the authors found that a trace of HCl or soap in the water quickly killed the embryos.

6. *Fixation of the embryos in water to which serum is added.*—A few drops of dogs' serum were added to water containing active embryos, in a watch glass. This albuminous fluid on evaporating forms at its edges a thin semi-solid drying border. All the embryos, one after the other, coming full tilt against this slightly viscous border, stop, thrust the anterior end several times into the viscous mass as if searching for a favourable spot, and then become quiescent. One minute after the fixation of the head

of the embryo, the peripheral cilia and those of the flame cells cease all movement.

This phenomenon is seen if the water is mixed with a few drops of urine containing blood and appears to be a biological fixation such as is undergone by the embryo at the start of its development in its host. Nothing like it is seen in pure water, even during continuous evaporation. The phenomenon has nothing in common with the entanglement of the embryos in sticky matter. Embryos enclosed in mucus move about trying to get free. Even when progression is prevented, the cilia continue to move, and when these at length cease, the cilia of the flame cells can be seen moving for a still longer period.

The authors failed to observe any analogous behaviour of embryos placed on pieces of skin and mucous membrane of monkeys, rats and fowls, or directly on the body of small rodents. They failed to infect rats and mice soaked for many hours in water teeming with embryos. They confess themselves unable to form any idea of the normal mode of infection of human beings.

H. M. H.

FERGUSON (A. R.). **The Lesions of Bilharzial Disease.**—*Glasgow Med. Jl.* 1913. Jan. Vol. 29. No. 1. pp. 14-23. With 3 plates.

Ferguson in the introduction to his paper points out the wide-spread distribution of bilharziasis. Since the Philippine war it has been found in many parts of the United States. MANSON in his Lane lectures (San Francisco 1905) gave warning that this might happen. The author himself felt certain that troops returning from the South African war must have introduced the disease into Australia (see summary of NELSON's paper above).

Bilharziasis has existed in the Nile valley since the earliest times for (1.) Calculus of urinary bladder is found in mummies of almost every dynasty so frequently as to suggest the operation of the same local cause as now exists, *viz.* bilharziasis. (2.) Remedies known and practised by the ancient Egyptians for the relief and cure of haematuria are so numerous as to suggest that this condition was very frequent. (3.) RUFFER has recently demonstrated calcified bilharzial ova in microscopical preparations made from the kidney of a mummy of one of the later dynasties. In Egypt to-day the disease is prevalent and severe. Figures based on the discovery of eggs in excreta are useful as indicating that ova are reaching the surface of hollow viscera, urinary bladder, colon, rectum, and gall-bladder, but are of little value as an index of the degree of infection amongst the inhabitants as a whole. Statistics based on a series of consecutive post-mortem examinations give a higher percentage of infection. GREISINGER and SONSINO found that 35-40 per cent. of the people of Cairo were infected—figures based on the discovery of the parasite at autopsy. Ferguson thinks the only reliable basis of information lies in finding ova, calcified or recent, within the body. Selected tissues are slowly digested in 3-5 per cent. solution of KOH at 60-80° C. and then the sediment is examined with the microscope. By this method ova have been found in many unsuspected parts of the body, *e.g.* the ovary, lungs, brain, and spinal cord. He has thus proved infection in 61 per cent. of 600 male subjects between 5 and 65 years old, which came consecutively to autopsy. A considerable number of young girls suffer from bilharziasis but he has not yet been able to establish the percentage proportion of infection with the same accuracy as for the male sex.

The worms appeared to select the inferior mesenteric vein route. Loos attributes this to some peculiarity in the venous blood in this vessel. If there are very wide and numerous anastomoses between the inferior mesenteric and middle and inferior haemorrhoidal veins, the worms pass over from the portal to the systemic system. They have been found in the inferior vena cava and the lungs.

Ferguson believes that for the bilharzial parasite no intermediate host is necessary, infection being direct from man to man. Infection does not take place by the gastro-intestinal tract. Miracidia are killed in three minutes by 1 in 2,000 dilution HCl. Infection most probably takes place by the cutaneous or one of the exposed mucous surfaces of the body. Observations carried out in Cairo by Davy and himself tend to show that infection is generally through the nasal mucous membrane. Possibly it may take place also at the genitalia. The author discusses shortly the validity of the species *mansoni*. In Egypt it may be stated positively that lateral spined ova do occur both in the urine and embedded in the vesical wall, and digestion of the rectal wall often shows lateral and terminal spined ova, the latter variety often in greater numbers.

H. M. H.

DISTOMIASIS.

Kobayashi (H.). **A Preliminary Report on the Source of the Human Liver Distome,** *Clonorchis Endemicus* **(Bälz)** (*Distomum Spathulatum*, **Leuckart**).—*Far Eastern Assoc. Trop. Med.: Trans. Second Biennial Congress held at Hong Kong.* 1912. pp. 108-112. With 1 plate.

Suggestions have been made that infection with the liver distome of Japan is acquired by drinking rainwater, eating uncooked molluscs, etc. Kobayashi's experiments prove these suggestions to be baseless. He examined a number of molluscs, fishes and aquatic arthropods for trematode larvae, and found a species of young distome encysted in the muscles of some freshwater fishes. It was most common in fishes from localities where infection with the liver distome was most frequent. Cats are often found naturally infected with this distome and these animals were therefore used for experiment. Kittens, ascertained beforehand to be uninfected by repeated examinations of the faeces, were given the flesh of fish containing the above mentioned encysted distome, and otherwise were fed exclusively on boiled rice and disinfected milk. Nine kittens and two adult cats were fed on the flesh of *Pseudorasbora parva*, and *Leucogobio guntheri;* all became infected. They were killed or died and examined at varying intervals after the feed. The bile duct, hepatic ducts, the gall bladder, pancreas and duodenum were found infected. Some infected flesh of *P. parva* was forced into the gullets of several rabbits and guinea-pigs. After some days their livers were found infected with identical distomes. The author describes the flukes obtained in these experiments and points out characters distinguishing them from *Metorchis truncatus, Opisthorchis felineus* and *O. noverca*. He believes they all were *Clonorchis endemicus*, in spite of their small size, this apparently depending upon the space and nourishment available for the parasite. Nine species of fish were found to harbour the encysted distome in question, the most commonly and heavily infected being the two mentioned above. The author uses the name *endemicus* for one of the two species of Japanese human liver distomes distinguished by Loos. He proposes to show later that these two species are really one.

H. M. H.

Roux & Tardieu. Un Cas de Distomatose Hépatique (*Opisthorchis Sinensis*) **chez une Européenne.**—*Bull. Soc. Méd.-Chirurg. de l'Indochine.* 1912. Oct. Vol. 3. No. 8. pp. 528-532,

The authors note the great frequency of infection of the natives of Tonkin with *Opisthorchis* (*Clonorchis*) *sinensis*. The investigations of Séguin, Mouzels, Mathis and Léger shew that 30 per cent. are infected. Only one case in a European had been described, by Audiau in 1910. This patient had lived many years like an Annamese, and had partaken exclusively of native food. The authors' patient, however, had never eaten of other than "*cuisine française*." She was 45 years old and was born in Guiana, where she had lived till 21; she had spent three years in New Caledonia and had been for seventeen years in Indo-China, during which time she had been three times to France. She was admitted to hospital to complete a convalescence after dysentery. Examination of the faeces revealed the presence of scanty amoebic cysts and ova of Trichocephalus, and a large number of ova of *Clonorchis sinensis*. By physical and radiographic examination the liver was not found enlarged. Analysis of the urine showed no trace of indican nor of bile pigments. No evidence could be gleaned of hepatic insufficiency. Dosing with glucose did not reveal any abnormal hepatic permeability for sugar. The first blood count gave the following percentages:

Neutrophil polynuclears	56	per cent.
Mononuclears	30	,,
Lymphocytes	6	,,
Eosinophiles	6	,,

On the patient's discharge after six weeks in hospital the percentages were respectively 66, 23, 6 and 4. Amoebae and Trichocephalus ova had disappeared and the eggs of the Clonorchis were very much fewer. The authors approve of Grall's statement that infection with this parasite sets up a condition of invalidism and that death, when it supervenes, is from an intercurrent disease. The patient denied having ever eaten Annamese food. She had never, in particular, eaten molluscs of which the natives of Tonkin are very fond. Drinking water and the various vegetables consumed in Tonkin are, the authors think, unlikely sources of infection, in view of the extreme rarity of infection amongst Europeans.

The authors' treatment was based on the principle firstly of stimulating the liver secretion, in order to expel mechanically the parasites from the bile ducts. For this purpose calomel, urotropine and salicylate of soda were given. Secondly they sought to expel the parasites from the intestines by purgatives and enemata. Such a treatment started at the onset of infection appears to give appreciable relief.

H. M. H.

ANKYLOSTOMIASIS.

STANNUS (Hugh S.). i. **Some Helminthological Observations in Nyasaland.**—*Jl. London School Trop. Med.* 1912. Dec. Vol. 2. Part 1. pp. 44-48. ii. **A Report to the Governor of Nyasaland Protectorate on Ankylostomiasis and other Helminth Infections.** 1912. Aug. [Received in Colonial Office, 1912, Nov. 16.]

These investigations were carried out mainly among the civil, military and prison population of Zomba. As regards ankylostome infection it is present in natives from practically all districts of the Protectorate. In the tables given by the author it is shown that the number infected is roughly proportional to the total number of men from any particular district. The figures for the troops bear this out. The figures relating to the military reservists also point to widespread endemicity throughout the Protectorate. The actual figures are:—26 per cent. of inmates of the Central Prison harbour ankylostomes; native troops 15·7 per cent.; reservists 18·6 per cent. Among the few women examined at the camp 38 per cent. were infected; but of twelve children under two years of age none was affected. The figures for the general population included both sexes and all ages over two years; 19 per cent. were infected, among whom were a number of children between two and five years of age. Excluding the few children under two years of age, of 493 persons whose stools were examined 22·2 per cent. were found to be infected. BASS has shown that by the ordinary method of examining faeces for ova, some twenty per cent. of cases are missed. Making such a correction the figure 42 represents the true percentage of infection. TURNER found 50 per cent. of infections among natives recruited from Nyasaland, Mozambique, etc. for the Transvaal mines.

The degree of infection is important; 'carriers' must be distinguished from 'diseased,' *i.e.* those harbouring ankylostomes from those suffering from ankylostomiasis. BASS estimates that one egg per microscopical slide roughly indicates an infection with less than ten worms, while NICOL in India states that to produce effects on the host there must be 500 worms present for six months.

In a large majority of the author's cases there have been one to two eggs per slide with a maximum of seven. This points to a low infection, and such is confirmed by the results of treatment and expulsion of worms and post mortem findings. The usual number of worms expelled was three to ten, maximum fourteen. Only two autopsies had been obtained on patients whose faeces during life contained ova. In one 25 worms were found, in the other nine. Of the 100 odd cases, fifteen complained of symptoms or showed signs of the infection. It is however very probable that slight grades of anaemia, loss of weight, joint pains, ineptitude for work etc. have passed unnoticed. A number of worms from the cases have been examined by LEIPER, who found both *Ancylostoma duodenale* and *Necator americanus.*

Evidence of infection with other helminths was obtained by finding the ova, in a comparatively small proportion of cases, of *Trichocephalus trichiura, Taenia* sp.? *Dibothriocephalus* sp.? and *Schistosomum haematobium*; in this in all cases the ova were lateral spined; none had symptoms referable to the infection present nor admitted ever having had symptoms of urinary bilharziasis. The larvae of *Strongyloides intestinalis* were also found in some cases. A rather remarkable point, the author notes, is the absence of any case of infection with *Ascaris lumbricoides.*

H. M. H.

JOYEUX (Ch.). **Le *Necator americanus* en Haute-Guinée. Notes d'Epidémiologie.**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 843-846.

This parasite is very common in Upper Guinea. There are many carriers of the worm, but few patients suffering from ankylostomiasis. A few however shewed all the symptoms of miners' anaemia of Europe. In marked cases there is a high eosinophilia. The larvae develop in the mud at the margins of streams near villages. It is usually in such places that the natives deposit their faeces. Under the microscope this mud is found to contain various species of nematode larvae in large numbers, and evidently forms an excellent culture medium. Sand from the banks of running streams contained no larvae.

Above a certain degree heat prevents development of the larvae; while tropical sunlight rapidly kills them. The author made cultures of larvae using animal charcoal in Petri dishes. At different ages one set was exposed to sunlight and the other kept in the shade. At the end of from two to two and a half hours the larvae exposed to sunlight were all dead. Those kept in the shade were living, the air temperature for both being 43° to 38° C. Again, eight days old larvae placed in a zinc box and exposed to air temperatures of 38° to 43° C. were all found dead after four hours; the temperature inside the zinc case was higher than inside the cardboard box which was used for keeping the larvae in the shade during these experiments.

Two *Cercopithecus patas* were infected experimentally with Necator, by causing them to swallow cultures rich in larvae. The first monkey died after 33 days, when many Necator were found attached to the mucous membrane of the small intestine, which was very congested, with numerous mucosal haemorrhages. No other lesions were found. The second monkey died after 37 days; only 30 Necator (7 ♂, 23 ♀) were found in the small intestine. Examination of the stools before experimental infection had shewn them to be free of the parasite, which is very rarely found, in nature, in this monkey in Guinea. Some of the nine days old culture, which (when ingested) infected the first monkey, was placed on the abdomen and inguinal region of a third *C. patas*. The animal lived 129 days. Its stools never contained ova and at autopsy no parasites were found.

The author tried many methods of treatment. He always obtained the best results from thymol finely powdered, followed by energetic purgation. He often used *eau de vie allemande* of the *Codex* (30 cm. for adults). This alcoholic fluid, when taken by children and adults who had received 2-4 gram. of thymol, never gave rise to toxic symptoms. Castor oil, like alcohol barred by classical rule, gave no harmful results, but was less successful. Such treatment, however, was never given more than once in one day.

H. M. H.

STILES (H. Wardell) & ALTMAN (W. L.). **Proportion of Males to Females in the American Hookworm** (*Necator americanus*), **Based on 13,080 Worms from 102 Cases.**—*U.S. Public Health Rep.* 1913. Jan. 3. Vol. 28. No. 1. pp. 7-20.

The point had been raised by LEICHTENSTEIN in 1885 that by counting the male and female hookworms passed by a patient and reckoning the proportion the clinician had a practical clue to the completeness or incompleteness of the cure effected. This point was based on the premises that the males and females were present in relatively fairly constant proportion and that the males are more difficult to expel than the females. This view was based upon *Ancylostoma duodenale* and the authors deemed it wise to test it as applied to *Necator americanus*. Various authors are quoted whose observations establish the general opinion that with *A. duodenale* females are much more numerous than males. From their own careful observations on 102 cases, a detailed statistical account of which is given in this paper, Stiles and Altman conclude that the estimation of the sexes in cases of infection with *N. americanus* with a view to determining whether or not cure is complete, is a method much more tedious, time consuming, and less reliable than microscopic examination of the stools. Of the 13,080 specimens of *N. americanus* collected from 102 cases 46 per cent. were males and 53 per cent. females. The proportion for different cases varied. Of the 102 cases 37 presented an excess of males, nine showed equal number of males and females and 56 an excess of females. The greatest number of worms collected from any one case was 2,277, the smallest 1, and the average 135.

From 75 to 95 per cent. of the worms of a given course of treatment may be passed within twelve hours after the early (6 a.m.) dose of thymol, and worms may continue to pass for several—at least six—days following.

Therefore treatment once per week is as frequent as it seems either necessary or wise to give it. Even if eggs be found on the fifth day after treatment a second course may be entirely unnecessary.

H. M. H.

STILES (Ch. Wardell) & LEONARD (Geo. F.). **Hookworm Disease. Number of Treatments and Number of full Doses of Thymol administered in 61 Hospital and 22 Home-Cured Cases of Hookworm Infection.**—*U.S. Public Health Rep.* 1913. Jan. 17. Vol. 28. No. 3. pp. 119-124.

The authors state that the term 'cured' means that a week or more after treatment microscopic re-examination of the patient gave negative results.

Their study of the cases, details of which are given in this paper, leads the authors to the following conclusions:—

1. The desire to increase the dose of thymol considerably in excess of the present generally accepted maximal doses is natural, in view of the fact that so many patients fail to follow out the treatment until all worms are expelled, and therefore a considerable number of persons continue to distribute the infection.
2. Many cases of hookworm infection are cured by less than one maximal dose for the age group in question.
3. When thymol treatment is properly carried out, *viz.*, when given under adequate precautions and the margin of safety to the patient regarded, the present maximal doses seem to be entirely safe.
4. With illiterate and unreliable patients, if the thymol dose in home treatment be increased it is at the distinct risk of exposing to unnecessary danger these patients who may be cured completely with less than the present maximal dose.
5. Eleven deaths have occurred in the United States because of following thymol with castor oil instead of with salts; or because of carelessness on the part of the patient or his family. It is therefore unwise to have a general increase in the size of the dose of thymol for home treatment cases. It is even better to cut the doses down below the present maximal dosage.
6. With increase of sanitary privies, or with repetition of smaller doses, the same eventual curative result will be obtained as would follow an increased single dose of thymol. While the former plan will take a longer time it involves less risk and the improved sanitation will give additional results in other diseases.

The basic maximum doses of thymol noted in this paper are 5 to 9 years old 15 grains; 10 to 14 years old 30 grains; 15 to 19 years old 45 grains; 20 to 59 years old 60 grains, and 60 years old 45 grains.

H. M. H.

LEYS (J. F.). **Diagnosis and Dosage in Hookworm Cases in the Navy.**—*U.S. Naval Med. Bull.* 1912. Oct. Vol. 6. No. 4. pp. 552-555.

Ninety-six cases of hookworm infection occurred in Southern-bred recruits received at the training station during 1911. The author's experiences lead him to formulate the following conclusions.—1. Reliable diagnosis can be made by examining three slides representing nine portions of a natural stool. 2. Treatment—First day, bed and light fluid diet, 1 oz. Epsom salts at 10 a.m.; second day, in bed, thymol finely triturated, in capsules, grains 30 at 6, 7, and 8 a.m., 1 oz. Epsom salts at 10 a.m. Save all stools, count parasites. 3. If 150 parasites or more are found, three more such courses are likely to be required; if 50 parasites or more, two more courses are required; if less than 50 parasites then one more course is necessary. Following this rule all parasites will have been expelled in the vast majority of cases, and not more than one or two remain in any case.

4,061 parasites were removed from the 96 patients, an average of 42 per patient. The first course of treatment removed 3,585 or 88 per cent.; the second course 353—9 per cent.; third course 116—3 per cent. A fourth course required by only three patients expelled seven worms. In 27 cases in which the total number of worms varied from two to 144 all were expelled by the first course of treatment.

H. M. H.

LAW (W. F.). **A Short Account of the Spread of Ankylostomiasis in British Guiana and the Methods adopted for its Prevention.**—*Trans. Soc. Trop. Med. & Hyg.* 1912. Dec. Vol. 6. No. 2. pp. 33-43.

The author states that British Guiana, lying close to the equator, with an annual rainfall of 80 to 120 inches, has a hot, damp climate, with very slight variations in temperature, the mean being about 82° F. The inhabited part of the country is absolutely flat, and in many parts below sea level. The main industry is sugar cultivation which is carried out almost entirely by East Indian coolies brought from Calcutta under indenture. According to DANIELS, there is some evidence of the existence of the disease in the colony as long ago as 1846; *i.e.*, ten years before the first introduction of East Indian labour. In the Surgeon-General's report for 1901-2 attention was drawn to its increasing prevalence. From then a systematic crusade against the disease may be said to have begun. Both *Ancylostoma duodenale* and *Necator americanus* are found. Examination showed that fifty to seventy per cent. of coolies were infected on arrival, and from 2,500 to 5,000 immigrants had been imported every year for more than fifty years. Up till lately latrine accommodation for labourers was quite unknown. In their absence the coolie, most regular in his habits, proceeds before going to work in the early morning, to some waste piece of ground, preferably one covered with low bush, and there defaecates. In the hot damp climate such ground soon becomes highly infective, and as the coolies' feet and legs are quite unprotected, he readily acquires the disease. The use of latrines does away with this source of infection. The plan of campaign of the Medical Department was, 1. Examination of stools of all patients admitted to estates' hospitals. 2. Examination of stools of all newly arrived immigrants. 3. Treatment at earliest possible opportunity of all individuals found to be infected. 4. Report to Surgeon-General of results of 1 and 2 and publication of the figures in the Official Gazette. 5. Preventive treatment.

As regards this last no real progress was made up to 1904.

Points of practical importance are: 1. The latrines must be placed at a convenient distance from the labourers' dwellings with a good dry path leading to them. 2. Accommodation must be sufficient for the population. 3. Latrines must be kept clean. 4. Construction must be such as to suit the class for which it is intended. In this case the East Indians bring in with them a bottle of water for washing; and this was possible without messing the place for the next comer. 5. Distance from opening in latrine to trench or bucket must be sufficient to prevent any splash coming up on the person defaecating. The results have been a steady diminution in the number of cases treated on the estates, a lessened severity of disease in those requiring treatment, and a large economic saving.

H. M. H.

NICOLL (William). **The Anaemia of Ankylostomiasis.**—*Brit. Med. Jl.* 1912. Oct. 26. p. 1097.

The Blood Volume in Hookworm Disease. From his experiments, which are not detailed, the author draws the following conclusions:

1. Hookworm disease in dogs is not analogous to the disease in man. In the latter the disease is essentially chronic and progressive, gradually leading to a fatal termination. No great degree of resistance is acquired though some individuals are less susceptible than others. Persons of all ages are susceptible to infection. In the dog the disease is very acute and rapidly fatal. Only dogs under six months old succumb to the disease, though all dogs are more or less susceptible to infection. In older dogs, infection cannot be pushed beyond a certain point, even with long continued administration of infective material. In these some degree of anaemia is slowly produced and gradually recovered from; the animal regaining its normal state even though infection with the worm persists. The infection may last for over two years.

2. The anaemia in young dogs is characterised by great loss of weight, emaciation, prostration, intestinal haemorrhage, greatly reduced temperature, and accelerated and irregular heart beat. These symptoms were present to a less extent in older dogs suffering from a minor degree of anaemia. In the latter the erythrocytes were rarely reduced in number to any great extent, but the haemoglobin fell, in some cases, to as low as fifty per cent. of normal. In the acute disease of young dogs the erythrocytes were observed under one million per cmm. and the haemoglobin ten per cent. In both cases the blood picture was characterised by the large number of erythroblasts, often of large size, and polychromatophilia. Eosinophilia was not a constant sign either of infection or of disease; and was, in fact, observed on only a few occasions.

3. Infection is generally accompanied by fairly profuse intestinal haemorrhage, which is most marked in the early stages, and tends to disappear later.

4. The blood volume of dogs suffering from the minor degree of hookworm anaemia is not materially altered, but if anything, is somewhat diminished. The oxygen capacity of the blood per unit of body weight is also on the average somewhat decreased. In the acute stage of the disease the blood volume appears to be decidedly reduced.

5. In the early stages of infection the worms attach themselves to the lower reaches of the ileum but in the course of time they are found further forward.

6. Cats are much less easily infected than dogs, while monkeys and man were found to be insusceptible to infection with the dog hookworm.

H. M. H.

TRICHOCEPHALIASIS.

BERRIO (L. Posada). **Contribution à l'Étude de la Trichocéphalose et de son Traitement par le Latex d'Higueron.**—*Rev. de Méd. et d'Hyg. Trop.* 1912. Vol. 9. No. 3. pp. 178-184.

The author gives a detailed account of his many cases of Trichocephalus infection in Colombia, the lesions caused by this parasite, and the invariably successful effect of treatment with "Latex d'Higueron." This is a variety of *Ficus* and is identified by

E. ROBLEDO as *Ficus glabrata.* The author agrees with ROBLEDO that its active principle resembles that of *Ficus doliaria.*

The author concludes from his observations that the latex is also a good parasiticide for Ascaris, Strongyloides and also for Taeniidae.

He holds that no matter what the disease one ought to search for the presence of intestinal parasites and bring about their expulsion. For though it is well known that there are many who, while harbouring these parasites, enjoy good health, yet at some time or other the parasites can produce serious effects. The best parasiticide for expelling Trichocephalus is the latex d'higueron. In Médellin (Colombia) the Trichocephalus is not only the most common but also the most dangerous of intestinal worms. For adults the dose of the latex is 30-40 grammes.

H. M. H.

ASCARIASIS.

DEGORCE (A.). **Envahissement du Foie par de Nombreux Ascaris. Abcès Multiples du Foie.—Péritonite.—Mort.**—*Bull. Soc. Méd.-Chirurg. de l'Indochine.* 1912. Dec. Vol. 3. No. 10. pp. 664-666. With 3 figs.

In this paper, which is well illustrated, the author gives details of a case of illness in a child seven years old, admitted to the hospital for natives at Hanoi for severe abdominal pain. These pains had lasted for two months and been severe for three weeks previously. They came in paroxysms. In the left subcostal region could be felt a hard rounded mass the size of a mandarin orange, continuous with the liver. There was profuse sweating at night. Constipation was marked and the faeces were found to contain ascaris eggs. A liver abscess was suspected but as the diagnosis was not certain and the child's condition was very bad no immediate operation was decided on. It soon became apparent that peritonitis had set in, and death ensued. At autopsy general purulent peritonitis was found. One ascaris was found in the peritoneal cavity beneath the liver. The liver was adherent to the diaphragm and its surface covered with yellowish bosses. At its anterior border was the opening of an abscess of the size of an egg. On section the liver was found to be riddled with small abscesses the size of a nut. In these abscess cavities were numbers of ascaris. The much dilated bile ducts were full of them and they were found everywhere in the liver. Their number was not counted. All were small and had doubtless entered the liver when their development was little advanced. None were found in the gall bladder. Histological examination revealed lesions of chronic cholangitis with at certain points commencing biliary cirrhosis.

H. M. H.

HENRY. **Appendicite et Ascarides.**—*Rev. de Méd. et d'Hyg. Trop.* 1912. Vol. 9. No. 2. pp. 130-131.

The author has noticed on several occasions deaths resulting from convulsions, without other symptoms, in children who harboured ascarides. He believes that convulsions were caused by the presence of the parasite in the appendix. He gives details of two cases supporting this view. One child, two and a half years old, very emaciated, was found to have ascaris ova in the stools. One worm escaped by the mouth, and five in the faeces after a vermifuge. The child continued to pass ascaris ova, was suddenly seized with convulsions and died. At autopsy the only possible cause was a large ascaris completely filling the appendix.

The second child, fifteen months old, also with ascaris ova in the stool, was treated as the first case without any worms being passed. Death resulted from convulsions. At autopsy the appendix was again found to be occupied by a worm and in addition worms were found in the ileum and colon.

These observations tend to shew that vermifuges are useless for the removal of worms in the appendix. Surgical intervention is indicated.

In the discussion on this subject TANON recalled that ascaris appendicitis has been described in classical treatises. Henry's cases were rare. Analogous cases of ascarides in the appendix had however been recorded in Haiti.

H. M. H.

LAMOUREUX (A.). **Un Cas d'Ascaridiase Mortel.**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 842-843.

A young soldier, native of Grande-Comore, was admitted to the military hospital at Majunga (Madagascar) on 10th October, 1912. He had been taken with syncope during manoeuvres, and on admission his condition resembled somewhat that found in the second week of typhoid fever; T. 39° C., low delirium, vomiting, distended abdomen very tender to pressure. On the third day, symptoms persisting, the patient vomited up two *Ascaris lumbricoides* 10 cm. long. On the fourth and fifth days after thymol treatment ten ascarids, 10-15 cm. long, were passed by the anus. Symptoms did not improve and on the sixth day the patient died in a state of collapse.

Necropsy revealed the following—One ascaris in the oesophagus, the stomach and first part of small intestine empty. In the second part of the small intestine and lower down ascarides were found in packs of ten to fifteen worms. The number of these increased as one approached the ileo-coecal valve, near which huge packs were found. The large intestine contained none. Upwards of 132 worms were removed from the alimentary canal. Although the worms were in packs, at no point did they form a dense enough mass to block completely the lumen of the gut.

At the places where the ascarides lay were found a number of dark red patches, situated beneath the mucous membrane and raised one millimetre above its level, circular or elliptical in outline, with a smooth non-excoriated surface. They varied in size up to 6 cm. long by 2 cm. broad. There were more than 30 of these at the spot where the worms were in greatest number. At this last point there were peritoneal adhesions between the coils of intestine and the body wall.

There was no sign of perforation of the gut, and no wandering ascarides were found in the peritoneal cavity or in the abdominal and thoracic organs, all of which seemed macroscopically to be normal.

H. M. H.

OXYURIASIS.

BRAU. De l'Oxyurose en Indochine.—*Bull. Soc. Méd.-Chirurg. de l'Indochine.* 1912. Nov. Vol. 3. No. 9. pp. 582-584.

The author states that the presence of oxyuris has been seldom recorded in natives of Indo-China. MATHIS and LÉGER do not mention it. JOUVEAU-DUBREUIL in 1910 recorded one case and concluded that it was extremely rare, at any rate among Asiatics.

By administering thymol however Brau has found many individuals among the " tirailleurs " harbouring this parasite and can now affirm its presence in natives of Cochin-China. Thymol appears to be the most efficient parasiticide. No males were ever found. Careful examination of the stools on no occasion revealed the presence of ova, a circumstance which may account for the existence of this worm having been hitherto overlooked. In the " tirailleurs " the parasites appear to cause a slight degree of anaemia. In children they set up a grave form of gastric derangement and even dysentery. In several cases expulsion of the worms caused the disappearance of the most diverse symptoms.

In contrast to the case of native children, eggs were often found in the stools of European children. In adults some degree of eosinophilia was found, more marked than in cases of ascaris infection.

H. M. H.

GENERAL AND UNCLASSED.

BELL (J.). Intestinal Parasites.—*Far Eastern Assoc. Trop. Med.: Trans. Second Biennial Congress held at Hong Kong.* 1912. pp. 115-117. With 1 plate.

The author examined 850 cases in Hong Kong: 23·2 per cent. Europeans, 29·8 per cent. Indians, 47 per cent. Chinese and Japanese. Of this number 41·3 per cent. were infected: 13·7 per cent. Europeans, 22·5 per cent. Indians and 63·8 per cent. Chinese. Multiple infection, in several cases eggs of three species being found together, occurred in 25·5 per cent. 111 females were examined; they suffered ten per cent. more than men. *Ascaris lumbricoides* was found in 46·6 per cent. One child died from intestinal obstruction caused by a mass of over twenty worms completely blocking the small intestine. Another child whose symptoms exactly resembled those of chorea, a rare disease in Hong Kong, speedily recovered after the expulsion of about ten worms. *Trichocephalus dispar* occurred in 26·2 per cent. It was the commonest worm in Europeans. *Ancylostoma duodenale* was found in 13·3 per cent. *Clonorchis sinensis* occurred in 12·9 per cent.; they were only found three times in Indians and never in Europeans.

Of thread worm there were only three cases, all in European children. *Taenia solium* was found once, in a European who probably acquired infection elsewhere.

H. M. H.

KINDLEBERGER (C. P.). **Intestinal Parasites and Diseases found in Guam.**—*U.S. Naval Med. Bull.* 1913. Jan. Vol. 7. No. 1. pp. 86-93.

The author records in interesting statistical tables the metazoan and protozoan intestinal parasites infecting the people of Guam, the largest island of the Marianas group. The list of helminthic parasites includes *Ancylostoma duodenale, Necator americanus, Ascaris lumbricoides, Trichuris trichiura, Strongyloides stercoralis,* and *Oxyuris vermicularis.* No tapeworms were found.

H. M. H.

RANSOM (Brayton Howard) & HALL (Maurice C.). **The Action of Anthelmintics on Parasites located outside of the Alimentary Canal.**—*U.S. Dept. of Agriculture: Bureau of Animal Industry. Bulletin* 153. 1912. Sept. 25. pp. 1-23.

After a careful historical review of the subject under consideration, with many abstracts describing experiments and observations of various workers, the authors give the following summary.

Results following the administration of *male fern* have been claimed as follows:—

Successful in six cases of human cysticercosis (*T. solium*), (four subcutaneous, one subcutaneous and cerebral, and one subcutaneous and ocular) and in two cases of human echinococcosis (one hepatic and one pulmonary); a total of eight cases of human somatic taeniasis.

Unsuccessful in five cases of ovine cerebral coenurosis, two cases of leporine general echinococcosis and one case of porcine muscular and ocular cysticercosis; a total of eight cases of somatic taeniasis in lower animals.

As regards the treatment of hepatic distomiasis in lower animals, the administration of anthelmintics is declared by various authors to have been effective in fourteen detailed experiments and in two other sets of tests with the number of animals not given.

In the case of venal distomiasis, male fern has been commended as being efficacious, with no data discovered by the authors as to autopsies showing that the death of the flukes in the blood vessels actually follows administration of male fern. For human bilharziasis, SANDWITH is quoted.

> "The liquid extract of male fern, in doses of fifteen minims three times a day, is the only drug of known value, for, though it does not expel the parasites, it seems to weaken their power of doing harm; it diminishes haematuria, allays vesical irritation and reduces the number of eggs passed in the urine and faeces."

JOANNIDÈS (1911), after administering salvarsan in eight cases of bilharziasis, claims that this drug destroys *Schistosomum haematobium* and its eggs, and thus brings about a cure of the disease.

Loos looks upon the cures reported by Joannidès as resulting from an artificial retention of the eggs in the tissues, causing thereby a suppression of symptoms, not a cure of the disease. He points out that the parasite itself in the blood vessels has practically no direct pathological effect, and that the lesions of the disease are due to the passage through the tissues of bladder, rectum, etc., of vast numbers of the parasites' eggs.

Conor (1911) tried salvarsan in one case of bilharziasis; eggs containing living miracidia were passed in the patient's urine every day but one, for a month after treatment.

Fülleborn and Werner (1912) have also tried salvarsan in a case of bilharziasis, with like negative result.

Day and Richards (1912) report three cases in which salvarsan was administered with no effect on the passage of living ova, or, in two cases examined, on the eosinophilia.

Carbon bisulphide and male fern were found by the authors to be inefficacious in at least six cases of intestinal and extra-intestinal thysanosomiasis.

They remark that there is much more likelihood of cases being published where the administration of a medicine is followed by apparent cure of diseases than where evident failure has resulted. Critical examination of the cases will reveal other objections. None of the cases of distomiasis specifically eliminate the possibility of the natural death and spontaneous evacuation of the flukes, the usual ending of the yearly life cycle, although the use of control animals would meet this objection.

None of the Joannidès cases was followed by post-mortem examination, and so far as case records are available, in no case of bilharziasis treated by male fern has an autopsy been available subsequently, to ascertain if the drug had killed the flukes. The subject is worth further investigation. Improved technique and better drugs have marked great advance in the treatment of some protozoan diseases, and at present it is not necessary to conclude that metazoan parasites outside the digestive tract cannot be killed by selective action of drugs without injury to the host.

H. M. H.

Leiper (R. T.). **Gapes in Man, an Occasional Helminthic Infection: A Notice of its Discovery by Dr. A. King in St. Lucia.**—*Lancet.* 1913. Jan. 18. p. 170.

Writing from Calabar the author records the receipt, just before leaving England, from King in St. Lucia, of a male and female *Syngamus*. The worms were obtained from a woman who had chronic cough. The patient said the worms were coughed up with blood. The worms were *in copula*. The presence of ova in the buccal cavity of the male was suggestive of there having been other worms present of the same species. The ova were identical with those in the uterus of the female. Leiper thinks it highly probable that this Syngamus is a purely accidental infection of man with a parasite common in one of the domesticated animals. *Syngamus trachealis* is a very common parasite in poultry and game birds. He does not know of any undoubted instance of the infection of a mammal with a normally avian parasitic nematode. Unless KING had been misled by a neurotic patient he is to be congratulated on a most suggestive and interesting find.

H. M. H.

WEINBERG (M.) & Mlle. KEILIN. **Une Maladie de l'*Ascaris megalocephala*.**—*Compt. Rend. Soc. Biol.* 1912. Aug. 2. Vol. 73. No. 28. pp. 260-262.

The authors describe lesions found in the ascaris of the horse. These are large, hard plaques, yellowish grey in colour and situated more especially in the anterior third of the worm.

Microscopic examination of sections through the lesion and body wall of the worm showed an inflammatory process extending to the subcuticular tissue down to the muscles, the cuticle itself being sometimes ulcerated. It causes the death of the worms. Certain appearances incline the authors to suspect a protozoon as causative agent—a matter on which they are pursuing further researches. They think that this dermato-myositis of the ascaris may prove of importance in helminthic pathology, and remark that it will be of great interest if a like disease be found in the human ascaris.

H. M. H.

WALKER (H. F. B.). **Hydatid of the Submaxillary Gland.** [Memoranda.]—*Brit. Med. Jl.* 1913. Jan. 18. p. 117.

The patient, a little Kaffir girl, presented a somewhat pendulous tumour immediately below the left ramus of the mandible. Six years had elapsed since the tumour was first noticed, and it had caused no symptoms. The cyst was removed entire, and contained 79 cc. clear fluid, many scolices, hooklets, and some small daughter cysts. The specific gravity of the fluid was 1005, without albumin.

H. M. H.

RAILLIET (A.), HENRY (A.), & JOYEUX (C.). **Sur Deux Trématodes de Primates.**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 833-837.

The authors give a description of a trematode from the chimpanzee. 300 specimens were obtained by BRUMPT from the hepatic and pancreatic ducts of an adult female. It is compared with other known species of the genus *Eurytrema* and is named *Eurytrema brumpti* (n. sp.).

A short description is also given of a trematode which the authors identify as *Watsonius watsoni* (Conyngham 1904). Six specimens were obtained by Joyeux from the coecum of an old female *Cercopithecus callitrichus*, E. Geoff.

H. M. H.

Pomella (C.). **Lésions provoquées par les Téniotoxines chez le Cobaye.**—*Compt. Rend. Soc. Biol.* 1912. Nov. 22. Vol. 73. No. 32. pp. 445-447.

The author prepared extracts of *Taenia perfoliata* and *Taenia plicata* from the horse. He found that intravenous injection of 2 to 3 cc. caused death of the guinea-pig more often with the extract of *plicata* than with that of *perfoliata.* Death ensued in from one to 24 hours. Some guinea-pigs survived. Some minutes after the injection the animals show trembling, mastication, dyspnoea, diarrhoea, incoordinate movements and paralysis of the hind quarters.

With subcutaneous injections of 1-2 cc. given every other day death follows after three to eight injections, and blood examination shows that it is due to an intoxication and not to secondary infection. Those animals that survive repeated injections are very wasted. Gravid females abort after a few injections.

Post mortem examination of an animal killed, or dead spontaneously, reveals at the place of injection a haemorrhagic focus and some oedema. Usually all the organs are congested and may show haemorrhagic foci. The liver shows fatty degeneration, often marked. In severe cases the kidneys show some fatty degeneration. The supra-renal capsules are much enlarged and congested. There is also enlargement of the lymphatic glands. On microscopic examination the spleen is found full of macrophages filled with red blood cells. The lymph glands contain iron bearing granules and the bone marrow a large number of eosinophile myelocytes.

H. M. H.

Henry (A.) & **Ciuca** (A.). **Recherche d'Anticorps spécifiques dans le Sérum de Lapin porteur de** *Coenurus serialis.*—*Compt. Rend. Soc. Biol.* 1913. Jan. 10. Vol. 74. No. 1. pp. 14-16.

For antigen the authors used (1) the fluid from the cyst, (2) aqueous extract of membrane and scolex, and (3) aqueous extract of *Taenia serialis.* These last two however sometimes gave fixation with the serum of normal rabbits and so were given up. Distinct fixation reaction was obtained twice with the sera of nine carriers. From this low percentage it might be thought that the same phenomenon occurred for *Coenurus serialis,* as Weinberg had described for carriers of hydatid cysts—*viz.* normally the parasitic fluid does not, or only with difficulty, get through the wall of the cyst. The absence of antibodies is then easily explained by the non-absorption by the host of antigen. Antibodies appear at once when traumatism allows of the escape of parasitic fluid into the host's tissues. 10-15 cc. of fluid obtained by puncture of their own cysts were injected into rabbits whose serum had given a negative reaction. Two out of three rabbits thus treated, tested after 65 days, gave distinct positive reactions, the third only a slight reaction. This last gave a strong positive reaction after a second injection. A fourth and fifth rabbit were injected with fluid from their own cysts, but after the cysts had been removed quite intact. In a sixth and seventh the cysts were slightly incised *in situ* so as to allow the free escape of the fluid into the subcutaneous tissue. In all the reaction of fixation was very markedly shown at the end of three weeks.

The serum of rabbits harbouring *Coenurus serialis*, or injected with the fluid from that parasite, does not give fixation reaction with fluid from hydatid cysts. The authors tested the serum of two dogs infected with numerous *T. serialis*. Negative results were obtained both with fluid from the cysts and with aqueous extract of *T. serialis*.

H. M. H.

CHOLERA.

EPIDEMIOLOGY.

*CONSEIL (E.). **L'Epidémie de Choléra de Tunis et de sa Banlieue pendant l'Année 1911.**—*Arch. de l'Inst. Pasteur Tunis.* 1912. No. 3. pp. 144-191.

An elaborate account of this epidemic, which involved 688 persons with 459 deaths. The case-mortality was higher in the very young and very old than in those of the middle period of life. The great majority of the cases were due to direct contact with the sick or with carriers, a mode of spread favoured by the habits of the people. Indirect contact, as by soiled linen or food, caused only a few cases, and water infection took scarcely any share in the epidemic. Prophylactic measures were directed chiefly to the isolation of the sick and of carriers, and, thanks probably to the energy with which they were carried out, the number of cases did not exceed 19 a day in a population of over 200,000.

The incubation period, in such cases as it could be accurately determined, did not exceed 4 days, was most frequently 1 or 2 days, and in a considerable proportion was less than one day. The number of contacts examined bacteriologically was small (only 160), and only 5 carriers were found, in one of whom the vibrios persisted for 9 days. In the sick the vibrios usually disappeared by the 9th or 10th day; but in 6 cases they remained for a longer period, once up to the 20th day, and in these cases the disease ran a protracted course.

J. Henderson Smith.

SERGENT (Edm.), NÈGRE (L.), BREGÉAT, & VIVIEN. **Notes Bacteriologiques relevées pendant l'Epidémie Cholérique de 1911 en Oranie.**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 790-791.

Cholera broke out at a farm previously free ten days after the arrival of a native woman from an infected district. The woman was found to be a carrier, and she continued to excrete the vibrios in large numbers from the 28th November 1911, when the first examination was made, till the 20th January 1912 without herself at any time showing any symptoms whatever. Of 8 persons with whom she came in contact at the farm 7 were infected, with 4 deaths; and in one of these the vibrios were discovered in the faeces 24 hours before the appearance of symptoms.

The authors also note the absence of any cases in a village of over 5,000 inhabitants, supplied with water which came from an infected district and was found to contain the typical agglutinable vibrios for over two months.

J. H. S.

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* In collaboration with ORTONA, E. LÉVY, GORDON, CALAMIDA, CORTESI, BOUHAGEB, CATTAN, CASSUTO, FRAUDET & BIENASSIS.

SIMOND (P. L.) & VALLERY-RADOT (Pasteur). **L'Epidémie de Choléra de Constantinople de Novembre-Décembre 1912.**—*Gaz. des Hôpitaux Civils et Militaires.* 1913. Jan. 21. Vol. 86. No. 8. pp. 117-120.

The cholera which recently attacked the army and people of Turkey includes two epidemics, which should be kept distinct though one was derived from the other. The first of these is the explosion amongst the troops. Cases appeared in the army on the right wing towards the end of October, probably brought over by troops from Anatolia. But they were not numerous until after the defeat at Lule-Bourgas, when the disease spread with extraordinary vehemence through the hungry, cold and exhausted troops as they retired. Everything favoured its propagation. The military camps at Derkos and Hademkeui presented the appearance of vast cholera-camps, the ground was covered with infected material, the available water-supplies were contaminated and adequate care or isolation was impossible. The sanitary services were choked with cases which they might not send to the rear, and they formed a separate camp at St. Stefano into which over 16,000 cases were sent. The real numbers of the sick are difficult to estimate. At the height of the army epidemic during the second fortnight of November probably 2,000 cases a day is a fairly correct estimate. As soon as the lines at Tchataldja were properly formed and some regulations could be enforced, the numbers dropped at once to under 200 a day, and soon cases became almost rare. The epidemic was almost pure cholera. There were some cases of dysentery certainly, but relatively few and scarcely any typhoid or typhus.

The second epidemic was that of Constantinople itself and its immediate neighbourhood. This was produced partly by infected soldiers sent back wounded, but to a greater extent by peasants originally infected from the troops. These people, fleeing before the Bulgarians, came in enormous numbers to Constantinople and the shores of the Bosphorus, whence they were transported to Asia. At first the cases were almost all amongst these peasants (and some troops), but as time went on, the peasant cases became fewer and large numbers of the civil population of Constantinople were attacked. This epidemic reached its maximum about the first fortnight of December, but the official figures give no real idea of the number of cases, which were said to total on December 27, 2,260. It is noticeable that in Constantinople itself the water was never infected.

J. H. S.

DIAGNOSIS.

SCHÜRMANN (W.) & ABELIN-ROSENBLAT (S.). **Die bakteriologische Choleradiagnose auf Grund von Prüfungen neuerer Anreicherungs- und Differenzierungsmethoden.** [Recent Enrichment and Differential Methods in the Diagnosis of Cholera.]—*Medizinische Klinik.* 1913. Jan. 26. Vol. 9. No. 4. pp. 138-142.

As the result of the comparative examination of various methods of isolation and identification the authors come to conclusions which may be summarised as follows. The peptone-water method is indispensable, and should be used along with other methods. Enrichment in bile (OTTOLENGHI) is fairly good, but if the number of vibrios is small, their growth may be suppressed or considerably delayed. BANDI's method of growing the material in fluid media to which dilute specific serum is added, may on occasion prove of value but is frequently unreliable, and the fluid alkaline blood-medium, suggested (but not recommended) by DIEUDONNÉ, is of little use. DIEUDONNÉ's solid medium, on the other hand, is excellent, and was not found to lower the agglutinability of the vibrios. PILON's modification of this medium appears also to be good. The experiments described in this paper follow the plan usually employed in similar investigations.

J. H. S.

RIVAS (D.) & SMITH (Allen J.).—**The Detection of Cholera Bacillus from Faeces & Water in Twenty-four to Forty-eight Hours.**—*New Orleans Med. & Surg. Jl.* 1912. Oct. Vol. 65. No. 4. pp. 273-275.

The suspected material is plated on litmus-lactose-agar and incubated for 18 hours at 37° C. Suspicious colonies are then inoculated into trypsinised peptone bouillon (for the preparation of which reference is made to a work of the authors in the *Centralbl. f. Bakt.* Vol. 63.) and incubated for 6 hours. The cholera-red reaction may then be tested on this fluid, and if positive gives fair evidence that cholera is present, when taken in conjunction with the morphology and staining characters of the organism. This result is obtained in 24 hours, but subcultures on the usual media for the other recognised tests, made from the trypsinised bouillon before testing for cholera-red, will enable a complete identification to be made in 24 hours more.

J. H. S.

TREATMENT.

EMMERICH (R.). **Zur rationellen Therapie der Cholera Asiatica.** [The Rational Treatment of Cholera.]—*Münch. Med. Wochenschr.* 1912. Nov. 26. Vol. 59. No. 48. pp. 2609-2611.

Emmerich sees in the successful results which have attended ROGERS' method of treatment (hypertonic injections of saline and oral administration of permanganates) further evidence in support of his view that the severe symptoms in cholera are due to the nitrous acid and nitrites formed by the organisms in the intestine. The injections replace the enormous quantities of alkaline fluid lost through the bowel in an attempt of the body to neutralise and wash out the acid poisons; and the effect of the permanganate is to oxidise these poisons in the stomach and gut into harmless nitrates. He states that the permanganate is there converted by the organic substances present into colloidal peroxide (MnO_2), which oxidises the nitrous acid at the moment of its formation; and he accordingly recommends instead of the permanganate a preparation of such colloidal peroxide. This preparation, which is stated to be quite harmless, is to be taken as a drink by the patient freely. Reconversion of the nitrate into nitrite is not to be feared, as the vibrios are already greatly reduced in nitrite-forming power by the previously formed nitrite !

In the early stage of the disease the best treatment is a nitrate-free diet, but he has had good results from the oral administration of 1 per mille amidosulphonic acid as a drink or 1 per cent. in small quantities hourly.

J. H. S.

CARRIERS.

JATTA. **Les Porteurs de Germes et leur Importance dans l'Epidémiologie et la Prophylaxie du Choléra.**—*Bull. Off. Intern. d'Hyg. Pub.* 1912. Nov. Vol. 4. No. 11. pp. 1995-2005.

During the 1911 epidemic at Naples 10 per cent. over all of healthy "contacts" were found to be carrying the vibrio of Koch. The numbers varied greatly in different cases. In some instances none or few of the contacts associated with a case were found to be carriers, in other instances most or all of the immediate contacts were infected, and in the latter it was nearly always found that the infection was conveyed through a common food-supply. The organisms found in carriers were no less virulent than those isolated from actual cases, but they were present always in smaller numbers. This fact, combined with the absence of diarrhoea in the carrier, reduces the danger which they bring to the community; but that the danger is real is shown by a number of examples which are given. Thus, in various institutions case succeeded case until a systematic examination of all inmates was made, when the presence of one or more carriers was discovered, and immediately on their isolation cases ceased. If no such examination and isolation were carried out, the cases continued, and in places where examination was made before admission to the institution, no cases occurred.

Healthy carriers usually stopped excreting the vibrios in 3-5 days, but 15 per cent. continued to carry them for 6-12 days. Whether those who carried for more than 5 days were really mild cases of the disease could not be definitely decided; but Jatta is satisfied that the period of 5 days usually taken as sufficient is not enough, and in practice carriers were kept isolated until repeated examination showed them to be free. If a carrier became subject to a gastro-intestinal disturbance from some other cause, he might develop cholera, and in this fact perhaps lies the explanation of those cases which develop several days after the last contact.

In the Naples epidemic 90 per cent. of the cases were due to infection through direct communication with patient or carrier. Even when infection occurred through taking contaminated food, the presence of a case or a carrier was nearly always demonstrated in connection with the food-supply, as in the kitchen or dairy, etc.

An account is given of the measures adopted to check the spread of the disease. These follow the recognised lines and were thoroughly carried out, directed in principle rather against the human source of infection than against other things.

J. H. S.

Greig (E. D. W.). Recent Research on Cholera in India.—*Indian Med. Gaz.* 1913. Jan. Vol. 48. No. 1. pp 8-11.

After referring to the frequent occurrences of cholera vibrios in the gall-bladder of fatal cases Greig states that he examined a number of convalescent cholera patients who were about to leave hospital, and found 36 per cent. of them still excreting the vibrios in their faeces, in one case 30, in another 44 days after the acute attack. He found that the serum of such cases agglutinated, while that of convalescents without vibrios in the faeces did not agglutinate. Of 27 " contacts " at Puri 6 apparently healthy persons were found to be carriers. Greig describes a clear case of infection being conveyed into a jail by a carrier; and states that during the epidemic at Puri cholera was found in flies both on the external surfaces and in the alimentary tract.

J. H. S.

CHOLERA IN RELATION TO OTHER ORGANISMS.

Pane (Domenico). Antagonismo tra Microrganismi isolati dalle Feci ed il Vibrione di Koch. Virulenza del Vibrione di Koch isolato da Portatori. Un Vibrione Acquatile. [Antagonism between the Vibrio of Koch and Organisms isolated from Faeces. Virulence of the Koch Vibrios isolated from Carriers. A Water Vibrio.]—*Riforma Medica.* 1912. Nov. 9. Vol. 28. No. 45. pp. 1233-1241.

From a number of persons actually suffering or recently convalescent from cholera the predominant organisms present in the stools were isolated and examined, to ascertain whether they exerted any inhibition on the growth of cholera. In all 25 organisms were tested by growing them on agar plates for 2 days and then inoculating the same plates with cholera, but only *B. pyocyaneus* was found to have a definite antagonistic action. This property of *B. pyocyaneus* has been already noted by Eijkmann, and is due to the production of a diffusible substance, which resists boiling and remains active after the medium has been neutralised—a point in which it differs from a thermostable inhibiting substance produced by *B. prodigious.* In peptone-water a similar body is developed but more slowly, and in young cultures it is not thermostable. Neither the presence of *B. pyocyaneus* nor its sterilised products are able to prevent the death of guinea-pigs injected with cholera intraperitoneally.

No appreciable difference was found in the virulence for guinea-pigs of cholera strains isolated from carriers and those isolated from actual cases. During a cholera epidemic Pane isolated from a water-supply a vibrio, which resembled the true cholera organism, and was haemolytic and pathogenic for guinea-pigs, but it did not produce the characteristic change in the suprarenals and was distinguishable from the vibrio of Koch by agglutination tests.

J. H. S.

LANDES (L.). **Etude de quelques Vibrions isolés au Cours des Poussées Epidémiques du Choléra, en 1911-1912, en Algérie.**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 792-796.

Of 25 vibrios isolated from the stools of cholera patients (and examined several months after isolation), 17 gave the typical Pfeiffer phenomenon, and of these 17, 14 were agglutinated by specific serum in dilution of at least 1-1000, 2 in dilution of 1-500, and 1 in dilution of 1-100. Of 5 vibrios isolated from water, 1 was agglutinated in 1-1000, and gave the Pfeiffer phenomenon. Among the 15 strains that were highly agglutinable, 14 gave both the indol and nitrite reactions, while of the 15 less agglutinable strains only 5 gave these reactions. The other reactions studied (formation of a cloud in peptone-water, growth in gelatin-stab, growth on potato or milk) gave little assistance in differentiating true cholera from other vibrios, and the haemolytic power was pronounced in only three strains, all of them only little agglutinable.

J. H. S.

BAERTHLEIN. **Ueber choleraähnliche Vibrionen.**—*Centralbl. f. Bakt.* 1. Abt., Orig. 1912. Dec. 30. Vol. 67. No. 5. pp. 321-335.

The use of modern media, especially of DIEUDONNÉ's alkaline blood-agar, has shown that vibrios occur more frequently in faeces than was formerly supposed, particularly in cases of intestinal disturbance. Baerthlein has examined a number of these organisms, including one that was isolated in pure culture from the blood of a patient whose clinical condition had suggested food-poisoning. He would, however, limit the term "cholera-like" to vibrios which have only one flagellum and are culturally and morphologically indistinguishable from true cholera. He finds that there is another group which has more than one flagellum and culturally and serologically resembles the *B. faecalis alcaligenes*, and these he would keep apart. The true cholera-like vibrios can be distinguished from cholera by agglutination, but not so clearly by complement-fixation. They are usually pathogenic for guinea-pigs, and most of them are haemolytic.

J. H. S.

VAN LOGHEM (J. J.). **Ueber den Unterschied zwischen Cholera- und El Tor- Vibrionen. (ii. Mitteilung.)** [The Differences between Cholera and El Tor Vibrios.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1913. Jan. 11. Vol. 67. No. 6. pp. 410-419.

According to the author haemolysis is always produced in fluid blood-media by El Tor strains, but never by genuine cholera strains isolated from undoubted cases of cholera during an epidemic. Both types of organisms, however, on blood-agar produce clear zones around the colonies and this is commonly attributed to haemolysis. Only the El Tor zone does in fact contain oxyhaemoglobin, in the cholera zone there is no diffusion of oxyhaemoglobin and the clear zone is attributed by Van Loghem to a digestive action of the cholera vibrios on the blood cells without any true haemolysis. The peptic action which cholera exerts on gelatine is found to run parallel to this haemodigestive action, and probably the two are identical. El Tor vibrios possess a similar digestive action, but they have in addition a true haemolytic power, which cholera never has. Although, then, the serum reactions of the two kinds are so exactly alike that one cannot by these means distinguish between them, Van Loghem agrees with those authors who regard the El Tor vibrios as a quite distinct type from the true cholera organism.

J. H. S.

UNCLASSED.

CHWILEWIZKY (Mnoucha). **Ueber die Beschleunigung der Nitritproduktion in Kulturen von Choleravibrionen in Nitratbouillon durch deren vorhergehendes Wachstum auf verunreinigtem Boden.** [Acceleration of Nitrite-production of Cholera by previous Growth on Impure Soil.]—*Arch. f. Hygiene.* 1912. Vol. 76. No. 8. pp. 401-419.

Chwilewizky took selected samples of soil, packed them firmly into tubes in the manner introduced by EMMERICH, and allowed a solution of sodium nitrate or in some instances of water to soak up from the foot by capillary force. In this process the rising fluid dissolves and carries with it all the soluble organic and inorganic substances it meets with, and as evaporation proceeds from the top, these become concentrated in the superficial layers. (A similar process is held to occur in nature during a dry season, but after heavy rain or in a wet season the current of water is reversed and no such concentration takes place). The tubes were then inoculated on the surface with cholera vibrios, and after a short interval, usually three days, subcultures were made into nitrate-bouillon, and the rate of nitrite production determined.

The soil used was taken from a place in a Munich suburb which was exposed to heavy faecal and other contamination, and fluid expressed from it proved a good culture medium for cholera. It was compared with clean soil from another part of the same district, as well as with other control cultures. The samples were taken in July and also in December of 1911, a year exceptionally dry and warm in Munich. In the result it was found that in all cases, whether the soil was used sterilised or unsterilised, and after imbibing water or nitrate solution, the organisms on the surface of the impure soil had a greatly increased capacity to produce nitrites, as compared with those on clean soil and on nitrate broth controls. To what extent this was due simply to greater growth of the organisms was not determined. On the other hand the organisms from the clean soil showed little or nothing of such an increase in reducing power; and on an old sample of impure soil collected during the wet year 1907, there was also no increased capacity, the vibrios in fact dying in the fluid expressed. Chwilewizky concludes that mere contamination of soil with manure and similar material is not enough to produce conditions favourable to the growth of cholera, a long dry period being required to allow of the transference of suitable nutriment in adequate quantity to the surface-layers.

J. H. S.

GALEOTTI (G.). **Ueber das Nukleoproteid der Cholerabacillen.** [The Nucleo-Proteid of Cholera Bacilli.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1912. Dec. 11. Vol. 67. No. 4. pp. 225-229.

Galeotti points out that so early as 1896 he had isolated and described the chemical and immunising properties of a substance, which is the same as those prepared from cholera vibrios by quite recent workers who are apparently unaware of his work. This body, of which the method of preparation is given here, is a toxic nucleoproteid, which produces in animals symptoms very like those of clinical cholera in man, and has marked immunising properties. The nucleoproteid is specially toxic if prepared from highly virulent strains.

J. H. S.

ZAMMIT (Th.). **Vibrions Cholériques isolés de l'Eau de Mer.**—*Bull. Soc. Path. Exot.* 1913. Jan. Vol. 6. No. 1. pp. 9-10.

The author obtained from the salt-water of a bay, into which cholera-contaminated material was delivered, abundant cultures of a vibrio indistinguishable from cholera, and this in 4 samples on 2 occasions one week apart. Subsequent samples were found negative. Half the samples were taken from the quay, the rest from the water several metres out from the bank. The vibrios were found in one cc. of water. They were agglutinated up to a dilution of 1-1,000 by specific serum, but not higher; gave the Pfeiffer phenomenon, were of typical appearance, liquefied gelatine in characteristic manner, gave the typical supernatant cloud on fluid media and a creamy growth on potato, coagulated milk, produced indol and formed nitrites from nitrates. Haemolysis of sheep corpuscles was not obtained in 5 hours but began in 24 hours.

J. H. S.

CANO (U.) & MARTINEZ (G.). **Einfluss der Wasserfauna auf Choleravibrionen.** [Influence of Water-fauna on Cholera Vibrios.] —*Centralbl. f. Bakt.* 1. Abt., Orig. 1913. Jan. 11. Vol. 67. No. 6. pp. 431-433.

Cholera vibrios lived 2-4 days in the intestine of goldfish, but neither the presence of these fish nor of water-beetles nor the larvae of frogs or water insects affected in any way the viability of the vibrios in the water.

J. H. S.

GOÉRÉ (J.). **Le Choléra et la Fièvre Typhoide peuvent-ils être propagés par les Lézards?**—*Compt. Rend. Soc. Biol.* 1913. Jan. 17. Vol. 74. No. 2. pp. 91-92.

Four of the common green lizards found in the districts near Tunis received by the mouth 0·5 cc. of a 24 hour broth culture of cholera vibrios. All were affected by the dose. One died in 30 hours after acute diarrhoea, and the intestine contained huge numbers of the vibrios. A second had diarrhoea for 2 days, and, gradually wasting, died after a month. Its stools contained vibrios during the whole month, and after death the organisms were recovered easily from the intestine. Both the other lizards had diarrhoea for one day, the stools containing vibrios for 2 and 5 days respectively, and recovered.

Two lizards received similar doses of typhoid bacilli without result, and the bacilli were not recovered from the stools.

Goéré thinks that lizards may act as carriers of cholera, especially considering their numbers and their habit of frequenting refuse left in the fields.

J. H. S.

THIROUX (A.). **Le N'diank, Choléra du Sénégal; Son Agent Pathogène.**—*Bull. Soc. Path. Exot.* 1912. Nov. Vol. 5. No. 9. pp. 753-762.

An account of a disease, which resembles Asiatic cholera in many respects, and in which from two cases Thiroux isolated a vibrio. The same organism was also isolated from the water of the river, but it presents several points of difference from the vibrio of Koch. The relationship of the disease to true cholera, if any, is undetermined.

J. H. S.

BERTARELLI (E.). **Perchè quest 'Anno non abbiamo avuto il Colera?** [Why have we had no Cholera this Year.]—*Gazz. d. Ospedali e d. Cliniche.* 1912. Nov. 5. Vol. 33. No. 133. pp. 1392-1394.

Some general observations on the fact that cholera did not reappear in Italy in 1912, although in 1911 everything seemed to point to an outbreak as inevitable. Bertarelli points out that it is easy to exaggerate the importance of carriers, and that we really know comparatively little of the epidemiology of the disease, *e.g.* the influence of environment on the vibrio, but he is inclined to attribute something to the prophylactic measures taken.

J. H. S.

DYSENTERY.

AMOEBIASIS AND AMOEBIC DYSENTERY.

MENETRIER (P.) & BRODIN (P.). **Dysenterie Amibienne. Début un Mois après le Retour en France. Six Rechutes Successives. Abcès du Foie Multiples et Dégénérescence Amyloide. Examen Histologique des Lesions du Foie et de l'Intestin.**—*Bull. et Mém. Soc. Méd. des Hôpit. de Paris.* 1912. July 25. 3 ser. Vol. 28. No. 26. pp. 143-150.

This is an account of the case of a young man who served his term of military service in Saigon (Cochin-China) and showed no signs of dysentery during his sojourn there. It is suggested that he became infected on the way home in the troopship from invalids on board, because a month after his arrival in France he was seized with diarrhoea and other characteristic symptoms, for which he was several times treated in Paris hospitals. A remedy whose nature is not further specified, but which goes by the native name of Kho-Sam,* gave the greatest relief of anything tried, and on one occasion arrested all symptoms for several months. Eventually, as the sequel to an accident, the disease reappeared, and an abscess of the liver led to an operation, to which the patient succumbed about seven years after the first appearance of symptoms.

Post-mortem examination showed the liver to be greatly enlarged, with three subsidiary abscesses. Its structure showed marked lardaceous degeneration, evidenced by the iodine reaction; and the glomerular region of the kidneys also reacted to the same test, while the spleen did not. The large intestine was ulcerated from end to end.

A minute account of the histology of the parts affected is given, but does not present many features of novelty. The authors, however, like KUBO (see below) point out that the ulceration in these cases seems to be produced by necrosis in mass of the superficial layers of the mucous membrane, owing to the mechanical interference with nutrition produced by the infiltration of the submucosa with amoebae.

S. R. Douglas.

GALLIARD (M.) & BRUMPT (M.). **Un Cas de Dysentérie Amibienne Autochtone.**—*Bull. et Mém. Soc. Méd. des Hôpit. de Paris.* 1912. Dec. 19. 3 ser. Vol. 28. No. 36. pp. 736-741.

An account of a case of amoebic dysentery occurring in a man aged 28, an inhabitant of Paris who had never left France.

The clinical picture, which is given in detail, is that of a typical case of amoebic dysentery of three and a half months' duration.

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* According to H. LEGRAND (see below) Kho-Sam is the seed of *Brucea sumatrana*, one of the Simarubaceae.

The treatment employed consisted of enemata of collargol, a milk diet and doses of Kho-Sam. The patient remained in hospital about one month and was discharged as cured.

The authors especially note the rapid improvement after the administration of the Kho-Sam.

Examination of the blood and mucus contained in the stools revealed the presence of numerous typical amoebae.

Some of this mucus was injected into the rectum of a young cat and the stools were found to contain amoebae after an incubation period of three and a half days. Figures are given of various types of amoebae found both in the patient's and the cat's faeces.

Five other cases of amoebic dysentery occurring in France in patients who had never left Europe are referred to.

S. R. D.

KUBO (N.). **Die ätiologische Bedeutung der *Entamoeba histolytica* bei Amöbendysenterie nach anatomisch-histologischen Befunden.** [The Aetiological Significance of *Entamoeba histolytica* in Amoebic Dysentery from the Histological Standpoint.]—*Arch. f. Schiffs- u. Trop. Hyg.* 1912. Nov. Vol. 16. No. 21. pp. 713-721.

The author considers the relationship of the entamoeba to this form of dysentery from an anatomical point of view, pointing out that the parasites are only to be found in the submucous layers of the intestinal wall. He suggests that as a consequence their part in causing ulceration can only be an indirect one.

From a case of dysentery which came under his notice, death occurring from intercurrent tubercular disease of the lungs, the author was able to obtain specimens of dysenteric nodules in the mucosa of the colon, which had not arrived at the stage of ulceration. Histological examination of such nodules revealed the characteristic infiltration of the submucosa with entamoebae, and as the patient had an amoebic abscess of the liver besides there could be no doubt as to the nature of the condition. But the amoebae were confined to this situation, while the mucous layer showed nothing more than cell-infiltration and diminished staining power. The author suggests that the necrosis of the superficial layers, which produces this characteristic form of ulceration, is brought about mainly by mechanical interference with nutrition, or by the action of toxic principles, and that a secondary infection with bacteria completes the process. Divergent views as to the relative parts played by bacteria and amoebae in this form of dysentery are thus to be reconciled.

An illustration is given of the microscopic condition present.

S. R. D.

CARINI (A.). **Un Autre Cas de Phagédénisme Cutané Amibien.**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 799-800.

After referring to a case of phagedenic ulceration of the skin, spreading from a wound made in opening an amoebic liver abscess, reported by him, the author describes the following case in which the wound made for the evacuation of a liver abscess showed a similar process.

The patient, an Italian workman aged 30, had suffered from dysentery for ten months and when admitted into hospital was found to be suffering from a large abscess situated in the right lobe of the liver. The abscess was opened and more than a litre of pus was evacuated, but the fever and dysenteric symptoms persisted in spite of treatment. Twenty days after the operation the edges of the wound became gangrenous and rapidly ulcerated, so that at the end of a week the ulcerated surface measured 10 by 8 cm. and in some places extended down to the muscles. The patient died. Shortly after death a piece of the necrosed tissue was examined and found to contain amoebae similar to *E. tetragena.*

In the author's opinion such a complication is not very uncommon, especially in cachectic patients.

S. R. D.

MAXWELL (James L.). **Fistulous Diseases of the Buttocks: A Clinical Entity.**—*Trans. Soc. Trop. Med. & Hyg.* 1912. Dec. Vol. 6. No. 2. pp. 50-53.

This is a description of a disease—a rare one—met with in South Formosa and probably also in South China. The lesion apparently starts as an ordinary fistula-in-ano and from this fistulous tracks spread in all directions over both buttocks, till the whole area is outlined by a maze of tracks, communicating with each other, and marked on the surface by raised and indurated lines. Here and there small pinholes openings, which discharge a serous pus, are seen. Actual pain is slight though discomfort in sitting is often marked. Treatment is unsatisfactory. Slitting up and scraping the sinuses is only palliative, and excision of the whole of the affected tissues is impossible owing to the large areas involved. The condition is not due to tubercle or syphilis. In the pus from some of the cases Maxwell noted entamoebae and he suggests that these may prove to be the causative agents of the disease.

In the discussion which followed the reading of the paper CASTELLANI drew attention to the fact that KARTULIS had previously described a clinically similar affection in Egypt. From these cases a Saccharomyces-like organism was isolated. Since that time CASTELLANI has met with the same condition in Ceylon and has confirmed KARTULIS' findings. WENYON pointed out the difficulty of distinguishing between pathogenic and non-pathogenic amoebae and shewed that the mere finding of these organisms in discharges from the lesions was not sufficient proof of a connection between the two.

G. C. L.

ROSENBERGER (Randle C.) & TERREL (Truman C.). **Amebiasis and the Results of Tests for the Determination of Occult Blood in the Feces.**—*New York Med. Jl.* 1913. Jan. 11. Vol. 97. No. 2. pp. 62-64.

In this paper the authors give the results of the examination of the faeces of 200 lunatics for the presence of blood and amoebae.

The faeces of 137 males were examined and of these 112 showed amoebae; of 141 females 81 showed amoebae.

None of these cases had any diarrhoea or dysentery and all the amoebae found resembled the amoeba coli.

In testing the stools for the presence of blood three tests were used:—(1) The turpentine and guiac test. (2) Benzidine. (3) A modified Meyer's reagent.

This modified Meyer's reagent consisted of "a solution of phenolthalein in 15 to 17·5 per cent. potassium hydrate which is boiled in distilled water with chemically pure, powdered zinc (Merck's) until colorless."

Amongst the 141 females blood was recognised in the faeces in 42·5 per cent. of the cases when this Meyer's reagent was used, in 33·3 per cent. with the turpentine and guiac test and in 35·4 per cent. when the benzidine test was applied. The faeces of 122 males were also tested for blood with positive results in 66·2 per cent. when the Meyer's reagent was used and 45·2 per cent. in the case of the turpentine and guiac test.

In very few of these cases were haemorrhoids or any other lesion which might lead to bleeding from the intestines discovered. Many of the patients showed some anaemia.

S. R. D.

WENYON (C. M.). **Experimental Amoebic Dysentery and Liver-Abscess in Cats.**—*Jl. London School Trop. Med.* 1912. Dec. Vol. 2. Pt. 1. pp. 27-34.

After giving a concise account of the earlier experiments on the production of amoebic dysentery in animals, the author discusses the question whether *E. tetragena* is the same as *E. histolytica*. The conclusions arrived at from the study of the literature are that these two organisms are most probably identical, that the life-history of *E. histolytica* as described by SCHAUDINN is erroneous, and that VIERECK really described the true life-history of this species and renamed it *E. tetragena* (cf. DARLING, see below). The author's own observations confirm this view as he has consistently failed to trace the life history of the pathogenic amoebae as described by SCHAUDINN, especially as regards the production of small, infective, tough capsuled spores, but when resting forms were discovered [and this appears to be only in a small percentage of the cases and generally when the patient is recovering naturally from the disease] they were always of the type described by VIERECK, namely, transparent cysts with four nuclei.

The author next discusses the production of amoebic dysentery in cats.

The material used in these experiments was obtained from the case of a European from Bombay; the blood-stained mucus found in his stools contained a large number of both amoebae and cysts, which cysts correspond typically with those described by VIERECK.

By means of a catheter about 5 cc. of this material was injected into the stomach and into the rectum of two cats which, after a period of nineteen days, were found to be passing typical dysenteric stools containing much blood and mucus and many amoebae.

From these cats others were infected and the infection was carried on through four passages without any sign of decreasing virulence. In order to ensure success in such experiments the author recommends the use of kittens soon after they have become independent of their mother.

Further observation on these dysenteric cats showed that frequently the mesenteric glands, draining the ulcerated areas of intestine, were swollen and contained large numbers of amoebae, which were apparently feeding on the gland tissue.

In one cat which died from dysentery liver abscesses were found; these were four in number, small and superficial, and contained large number of amoebae.

Discussing the question as to how the amoebae penetrate into the tissues the author gives as his opinion that some toxin must be excreted from the amoebae which brings about the degeneration of the epithelial cells and allows the parasites to pass into the connective tissue.

Experiments carried out to ascertain if *E. coli* could cause symptoms of dysentery were uniformly unsuccessful, although enormous numbers of these amoebae were injected both into the stomach and rectum of the cats.

The amoebae found in cats suffering from dysentery were similar to those found in man, the only point noticed being that degeneration forms were more numerous in the cats than in man; no encysted forms were seen, but in none of the cats did the dysentery pass beyond the acute stage.

The paper concludes with a detailed account of the experiments on the various cats.

S. R. D.

ROGERS (Leonard). i. **Sixty Cases of Amoebic Dysentery illustrating the Treatment by Ipecacuanha and Emetine respectively.** —*Indian Med. Gaz.* 1912. Nov. Vol. 47. No. 11. pp. 421-427.

ii. **The Rapid and Radical Cure of Amebic Dysentery and Hepatitis by the Hypodermic Injection of Soluble Salts of Emetine.**— *Therapeutic Gaz.* 1912. Dec. 15. Whole Series, Vol. 36. (3rd Series, Vol. 28.) No. 12. pp. 837-842.

iii. **Emetine Salts in the Treatment of Dysentery.** [Correspondence.]—*Lancet.* 1913. Jan. 11. p. 129.

i. A further contribution on the author's application to the treatment of amoebic dysentery of VEDDER's scientific investigations into the amoebicidal action of ipecacuanha and its constituents.

The only point not already noted in previous abstracts given in this *Bulletin* is that the author in one very severe case of dysentery administered emetine by intravenous injection, in addition to the doses usually given hypodermically. The doses given intravenously were one half gr. and two-thirds gr. on the first day of treatment and one gr. the next day; the salt of emetine used was the hydrochloride and in each case it was dissolved in five cc. of sterile normal saline. With these doses no symptoms of depression were noticed.

ii. This paper consists of a recapitulation of communications, published by the author in various periodicals, on the curative effect of hypodermic injections of soluble salts of emetine in case of amoebic dysentery. These papers have been fully abstracted in this *Bulletin*. No new facts are recorded.

iii. An answer to Lt.-Col. Tull Walsh's letter in which Rogers states that he considers the essential of the treatment of amoebic dysentery recommended by him is the subcutaneous injection of the soluble salts of emetine.

S. R. D.

Simon (Sidney K.). **A Further Word on the Ipecac Treatment of Amebic Dysentery.**—*New Orleans Med. & Surg. Jl.* 1912. Nov. Vol. 65. No. 5. pp. 373-377.

The author investigated the after history of a number of cases of dysentery which had been treated with ipecacuanha; he was able to trace 15 out of 35 cases and in none of these had there been any recurrence of the dysentery; the shortest period since the treatment had been carried out was six months.

The treatment employed consisted of:—Rest in bed for at least two weeks. Restricted diet gradually increased, milk being used sparingly or avoided. The ipecacuanha was given in the form of salol-coated pills, the doses being from 60 to 100 grains. Washing out the large intestine was, in the author's opinion, useless.

S. R. D.

Beck (Harvey G.). **Duodenal Medication of Ipecac in the Treatment of Amebic Dysentery.**—*Jl. Amer. Med. Assoc.* 1912. Dec. 14. Vol. 59. No. 24. pp. 2110-2114.

After a long review of the various methods used by different authorities for the alleviation of the disagreeable symptoms appearing after the administration of large doses of ipecacuanha the author recommends that the drug should be introduced directly into the duodenum with an Einhorn's tube.

The details of seven cases of dysentery treated by this method are given.

S. R. D.

Cohendy (Michael). **Essai de Traitement de la Dysenterie Amibienne par les Lavements au Sucre.**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 846-850.

After experimenting with various antiseptics, such as boric acid, potassium permanganate, silver nitrate, and copper sulphate, the author found that in strengths commonly used in enemata these substances were without action on pathogenic amoebae *in vitro*. Distilled water however quickly immobilised the amoebae and caused them to assume a spherical form. He therefore sought for some inoffensive substance which when dissolved in the distilled water would not alter its hypotonic characters which he believed produced a deleterious effect on the amoebae.

The substance selected was cane sugar and enemata were made by mixing 250 cc. of syrup, made according to the direction given in the French Pharmacopaeia, with three quarters of a litre of boiled water.

Directions are given as to the frequency of administration of such enemata, diet, etc., and the paper ends with an account of seven cases, some of which appear to have benefitted from the treatment.

S. R. D.

DEEKS (W. E.). **Treatment of Dysentery due to Infection with *Entamoeba histolytica*.**—*Jl. Amer. Med. Assoc.* 1913. Jan. 4. Vol. 60. No. 1. pp. 38-42.

The author's conclusions are that amoebicidal irrigations are useless and that the most successful treatment is a milk diet combined with the administration of massive doses of bismuth subnitrate, 180 grains being given every three hours.

S. R. D.

LEGRAND (Hermann). **Les Abcès Dysentériques du Cerveau (Amibiase Encéphalique).**—*Presse Médicale d'Egypte.* 1912. Oct. 15. Vol. 4. No. 20. pp. 309-315; and Nov. 15. No. 22. pp. 341-343.

The author gives an exhaustive account of a complication of amoebic dysentery, which is hardly mentioned in text-books, namely, abscess of the brain. This is almost exclusively an accompaniment of abscess of the liver, though the symptoms due to it may not appear till the liver lesion has become obsolescent, or has been cured. KARTULIS and JACOB put the proportion at three per cent. of cases of liver abscess, but Legrand thinks this ratio much too high.

The abscess is usually single and may vary in size from a walnut to an apple. It occurs most frequently in one of the hemispheres and may rupture into the ventricles and cause acute symptoms. One case of occurrence in the cerebellum has been noted. Meningitis is not often an adjunct, and therefore symptoms due to it are not usually to be observed. The pus resembles that of liver abscess in being viscid, grumous or tinged with blood (crushed strawberry colour), and in operating it is desirable to probe the brain with a trocar instead of an aspirator needle or knife. The amoebae are only to be found adhering to the wall of the abscess, and therefore lumbar puncture is not helpful in diagnosis; in some of the more recently reported cases they have been found in the pus and in sections from the wall of the abscess cavity.

The clinical symptoms do not differ materially from those of other chronic brain tumours.

It is suggested that infection arises through the amoebae getting through the barrier of the portal system, and thus causing thrombosis.

The author has collected particulars of 45 cases. They are analysed as follows:—

Geographical distribution.—

1 case has been reported from Madagascar.
1 ,, ,, ,, ,, ,, the Gulf of Mexico.
5 cases have ,, ,, ,, British India.
7 ,, ,, ,, ,, ,, the French Colonies of Indo-China.
26 ,, ,, ,, ,, ,, Egypt.
2 ,, no information is given of the locality.
5 ,, have occurred in persons who have never lived out of Europe, *viz.* 2 in France, 1 in Germany, and 2 in England.

Age.—With four exceptions the patients were between twenty and forty years of age, the exceptions being two cases above forty, namely 45 and 57 and two cases below twenty, a girl of five and a boy of fourteen.

Sex.—As in cases of liver abscess, this complication of dysentery is much more common in males than in females; only three cases have been reported amongst the latter and one of these was that of the girl of five mentioned above.

Occupation.—Fifteen cases were in men connected with the army and many of the patients had a history of alcoholism.

Race.—Europeans were most frequently affected but amongst the cases reported from Egypt there were a few Arabs and Copts.

Situation of the abscess.—

12 occurred in the left cerebral hemisphere;
10 occurred in the right cerebral hemisphere;
6 were multiple and sometimes bilateral;
6 had opened into the ventricles;
1 was in the left lobe of the cerebellum;
in 10 the situation of the abscess was not reported.

A detailed account of the morbid anatomy and histology is given.

S. R. D.

FINK (Lawrence G.). **Liver Abscess Treated by a Modification of the Leonard Rogers' Method.**—*Jl. Trop. Med. & Hyg.* 1912. Nov. 15. Vol. 15. No. 22. pp. 339-340.

A case of liver abscess in which the author used a trocar and canula to evacuate the abscess cavity and washed it out with salt solution through the canula, finally injecting four ounces of bichloride of quinine solution (ten grains to the ounce). This procedure had to be repeated in 13, 22, and 31 days, after which no further collection of pus took place. Pulv. ipecacuanha was given in thirty grain doses twice daily at first, later in smaller doses.

The author reports this case to show that, in the absence of an aspirator, a trocar and canula can be used to evacuate such an abscess.

S. R. D.

DARLING (S. T.). **Observations on the Cysts of *Entamoeba tetragena*.**—*Arch. Internal Med.* 1913. Jan. 15. Vol. 11. No. 1. pp. 1-14. With 2 plates.

After recounting many of the pathogenic human parasites, protozoal and metazoal, occurring in the cosmopolitan population of the Panama Canal Zone, Darling discusses the cases of amoebic dysentery that have come under his notice during the last seven years in Panama. He concludes that *Entamoeba tetragena* only occurs, and regarding *E. histolytica* he states that he is "inclined to doubt whether it has ever existed anywhere." He quotes HARTMANN as believing that SCHAUDINN was misled by degeneration forms in describing *E. histolytica.* He writes, "Schaudinn studied the peculiar forms from which he described *E. histolytica* in but one single case of entamoebic dysentery [in a Chinese], and his interpretations have been accepted and applied to many cases elsewhere by several observers." He considers that CRAIG's technique was at fault.

"The individual with acute symptoms of dysentery is not usually infectious, for he is merely harbouring the large vegetative form [trophozoite], which, to judge from the results of animal experiments, is digested and cannot serve to infect. It is the unsuspected individual who has recovered from an attack and who may have formed stools or possibly diarrhoea, whose stools contain cysts, that is the carrier of infection. The importance, therefore, of examining stools of recovered patients, and in fact all clinical cases as well as of persons in contact with clinical cases of dysentery, for the detection of carriers, is very great."

"The commonest location for entamoebic lesions" was "the caecum." "Cases of this type may give no evidence of infection other than colicky pains in that region, but they are undoubtedly fertile carriers of cysts. The stools of cyst-carriers are usually solid and contain no dysenteric elements—one of the reasons why tetragena cysts have been so long overlooked or misinterpreted."

The cysts are rounded, refractile bodies about 15μ in diameter. "When the cysts are quite homogeneous in the fresh stool, they will after exposure to the moist chamber or in vaselined films become differentiated in a day or two so that one, two or four nuclei may be seen."

"It would appear that when most cases of entamoebic dysentery are treated energetically by bismuth subnitrate, the vegetative or large pathogenic generation is at once removed, leaving none to propagate the small generation from which the cysts arise."

Darling considers that *E. minuta*, Elmassian, is "the small generation and cysts of *E. tetragena*."

In young cats fed on material from the stools of one of the cases, Darling states that the "alleged differences between *E. tetragena* and *E. histolytica* and *E. nipponensis* [*? nipponica*], are due to unusual physiological or pathological distributions of basichromatin within the nucleus of *E. tetragena*."

Darling doubts the occurrence of autogamy in cyst formation. Full details of three cases are given.

The memoir is illustrated by two plates which show trophozoites, schizonts and cysts of various ages.

The author's own conclusions with regard to his very interesting and important researches are as follows:—

"These cases illustrate the cyst production of *E. tetragena*, its intermittency, the absence of cysts during acute symptoms and their presence in formed stools long after the subsidence of acute symptoms.

"The gradual disappearance of cysts in moist chamber preparations with a concomitant loss of infectiousness of the stool, and the loss of infectiousness by drying for seven weeks are shown. The development of amebulas within the cysts and their emergence and fate in the faecal mass is described.

"It would appear that infection in man is the result of the contamination of food with a small amount of faecal matter containing a great many cysts, during the first day or two after passing.

"In one experiment, kittens were fed with a pure culture of tetragena cysts forty-eight hours old. This caused lesions in the small bowel in which large trophozoites were found with the nuclear characters of *E. tetragena*, *E. histolytica* and *E. nipponensis*. This not only favours the opinion held of the identity of *E. histolytica* and *E. nipponensis* with *E. tetragena*, but it shows that specific identification of *histolytica* and *nipponensis* cannot be made from the large vegetative trophozoites alone, but the essential features of the life-cycle must be seen.

"The very great importance of examining the stools of all convalescent and recovered cases of entamoebic dysentery for cysts, and thus detecting 'carriers' is made apparent, for it is the cyst that is the infecting agent and not the large trophozoite."

H. B. Fantham.

CRAIG (Charles F.). **The Relation of Parasitic Amoebae to Disease.** —*Amer. Jl. of Med. Sci.* 1913. Jan. Vol. 145. No. 1. pp. 83-100.

This paper is a reprint of one read at the 15th International Congress of Hygiene and Demography at Washington in September last. In it the author sets forth his views and summarises his researches on Entamoebae in the human digestive tract. Craig's views have been frequently stated during the last few years in numerous books and papers, and one of the latter was reviewed recently in this *Bulletin* (No. 4, pp. 179-180), to which those interested should refer.

It should be noted that Craig is a firm believer in the existence and entity of *E. histolytica.* He himself in 1905 confirmed SCHAUDINN's researches and he also records that PROWAZEK recently found the "species in dysentery cases in Samoa." Craig discusses (1) The relation of Entamoebae to disease and the relations of (2) *E. coli* (3) *E. histolytica* and (4) *E. tetragena* to disease. Craig summarises the differences between these three species thus:

"The nuclear structure of each species is distinctive, while *Entamoeba coli* forms cysts containing eight daughter nuclei, this number being sometimes exceeded: *Entamoeba tetragena*, cysts containing four daughter nuclei; and *Entamoeba histolytica*, cyst-like bodies, which are budded from the parent organism. In all these species the differences in the method of reproduction have been carefully studied, and, in my opinion, constitute the most important basis of specific differentiation."

The author's conclusions are as follows:—

"(1) *Entamoeba coli* is a harmless commensal in the human intestine.

"(2) *Entamoeba histolytica* and *Entamoeba tetragena* are pathogenic species capable of producing in man the disease known as amoebic dysentery.

"(3) *Entamoeba coli*, *Entamoeba histolytica* and *Entamoeba tetragena* are strictly parasitic species and have not been cultivated.

"(4) There is not sufficient evidence at present to prove that any of the amoebae that have been cultivated are pathogenic to man. All cultivated species belong to the genus *Amoeba*, and differ greatly in morphology and life-cycle from the parasitic amoebae, which belong to the genus *Entamoeba*."

H. B. F.

PENARD (Eugène). **Nouvelles Recherches sur les Amibes du Groupe Terricola.**—*Arch. f. Protistenkunde.* 1912. Dec. 14. Vol. 28. No. 1. pp. 78-140. With 59 text-figures.

The author gives a brief historical résumé of the work on the Amoebae found in moss, which organisms are capable of resisting desiccation by means of their "pellicle." He then describes *Amoeba terricola* (Greeff, 1866) an Amoeba possessing an unstainable, very fine, supple and pliant "pellicle," a large contractile vacuole and ellipsoidal vesicular nucleus. It rarely reaches 250μ; when sub-spherical it is usually 90-100μ.

Amoeba similis (Greeff, 1891)—Penard believes that he found an organism which may be *A similis*, but it closely approaches *A. terricola*.

A. papyracea (Penard, 1905) measures 160-190μ and when extended may reach 300 to 350μ. It varies much in appearance and structure and the author desires to abolish the name *A. papyracea* in favour of *A. terricola*; also to abolish the species *A. similis*.

A. fibrillosa (Greeff, 1891). This amoeba contains many nuclei, many contractile vacuoles, and has a remarkable circulation of its cytoplasm.

A. alba (Greeff, 1891) is multinucleate; often 100 nuclei are present.

A. sphaeronucleolus (Greeff, 1891) is a small form.

The second part of the paper deals with various functions of the Amoebae. The author shows that in these Amoebae there is no conjugation, division, encystment or sporulation. The movements, digestive processes and excretion are well described. A full and useful account of the various parasites of the Amoebae, mostly fungi, concludes the memoir.

[Although the paper deals only with terrestrial amoebae, yet it is not without interest to the tropical investigator who may be engaged on the difficult subject of amoebic dysentery, especially if he is searching various food-plants for possible stages of Entamoebae. Terrestrial amoebae must not be confused with Entamoebae.]

H. B. F.

BACILLARY DYSENTERY.

BUTLER (Chas. A.). **Some Laboratory Notes upon the Bacillus of Dysentery.**—*Bull. Manila Med. Soc.* 1912. Nov. Vol. 4. No. 11. pp. 180-191.

This paper is divided into three parts. The first refers to some experiments carried out in reference to the production of indol by various microbes; the second describes a method of preserving human or animal agglutinating sera which are used in the diagnosis of the various types of dysentery bacilli; the third gives the characteristics of an organism isolated from the water of an artesian well, which resembled in some respects *B. coli.*

With regard to the first subject, namely, the production of indol by bacteria, the author points out that the test is a rough one and that too much stress should not be laid on a slight positive reaction. Investigating the methods of preparing media for this test he comes to the conclusion that the medium recommended by Theobald SMITH, which has been rendered sugar free by planting into it *B. coli* and allowing growth to take place for about twelve hours, is a good one. Further investigations showed that the use of pure sodium chloride in media gave slightly fewer positive results than when kitchen salt was used.

The preservation of sera for carrying out the agglutination test is then described. The principle of this method consists of soaking strips of filter paper in the serum, drying in a current of air and preserving the dried paper in glass stoppered vessels containing calcium chloride.

The author gives full details as to the carrying out of this technique and discusses at length the merits of high and low potency sera; the conclusions arrived at being that a serum which agglutinates in a dilution of 1 in 100 with an hour's time limit is as useful as a higher potency serum when due care is taken in controlling the agglutination tests.

Serum of such potency can often be obtained from patients who have recovered from bacillary dysentery and the author frequently used such a source to obtain supplies of serum.

The last part of the paper deals with the description of an organism resembling *B. coli* isolated from the water of an artesian well, very favourably situated as regards sewage contamination; the well was cased and 486 feet deep. The characters of the organism were as follows:—*Agar,* whitish grey colonies with no great tendency to spread and less heaped up than *B. coli.* *Potato,* abundant growth turning brown after a couple of days. Nitrates were reduced to nitrites but no indol was produced in peptone solutions. *Broth cultures,* even turbidity and the organism showed very active motility. *Litmus milk,* acid and clot in 24 hours. *Morphology, staining, etc.*—Gram negative and rather shorter and narrower than typical *B. coli.* Voges and Proskauer's reaction positive. *Sugar fermentations,*—with glucose, lactose, maltose, mannite, saccharose, raffinose and dextrin, acid and gas were produced. With inulin there was no reaction.

S. R. D.

MIXED AND UNCLASSED.

WELLS (R. T.). Dysentery in Hazaribagh Central Jail, January 1910—March 1911. Being the Report of an Enquiry carried out by Capt. R. T. Wells, M.A., M.B., I.M.S., under the direction of the Director, Central Research Institute, Kasauli. —*Scientific Memoirs by Officers of Med. & Sanit. Departs. of the Govt. of India.* (New Series.) No. 52. 44 pp. With 3 plates. 1912. Calcutta: Superintendent Government Printing, India.

The report commences with a classification of the cases included in the returns as dysentery. This classification is as follows:—

- i. Specific ... ...
    - a. Bacillary.
    - b. Amoebic.
- ii. Non-Specific ...
    - a. Tubercular.
    - b. Malarial.
    - c. Due to Leishmania infection.
    - d. Verminous.
- iii. ... ... Dysentery of uncertain origin.

The dysentery showed a marked seasonal prevalence, the maximum incidence occurring during the months having the greatest rainfall; 3 charts are given.

In all, 268 cases of dysentery were investigated. Of these 4·9 per cent. were proved by the isolation of a bacillus belonging to the dysentery group to be "bacillary" and in 19·5 per cent. motile amoebae were found microscopically. Five cases showed typical tubercular ulceration of the intestines on post-mortem examination. By examination of the faeces it was found that intestinal parasites were of very frequent occurrence amongst the prisoners. A table is given showing the result of these examinations. The occupation of the prisoners seemed to have no relation to the liability to attacks of dysentery.

The results of a large series of blood counts (59) are given in several tables; the author's conclusion is that even in uncomplicated cases of dysentery a high and sustained leucocytosis may occur.

The agglutinating power of the serums of the patients suffering from the bacillary form of the disease was investigated, not only in the case of the organism isolated from the patient in question, but also in the case of the bacillus of Shiga and of Flexner. These results also are tabulated, the conclusion drawn being that, as none of the organisms were agglutinated by high dilutions of the sera, the agglutination reaction as an aid to diagnoses of bacillary dysentery is of little use. A large number of control sera from cases from which no dysentery bacilli could be isolated showed quite as marked agglutination with B. Shiga and B. Flexner. The reactions of the various (14) bacilli of the dysentery group isolated is shown in tabular form. Nine of these bacteria were found to be mannite fermenters, the remaining five having no action on this sugar; but within these two groups there were minor differences.

In the investigation of the cases of amoebic dysentery it was found that amoebae could be cultivated not only from the stools of nearly every case in which they had been observed by microscopical examination, but also from the stools of healthy men and the jail water. Further it was found that Petri dishes containing Musgrave's media left open to the air, sometimes for as short a time as thirty minutes, in many cases (14 out of 36) gave colonies of amoebae associated with moulds or air-borne bacteria. These air and water-borne amoebae were similar to those cultivated from the faeces of dysenteric cases, but throughout their life history showed marked morphological differences from those seen in microscopical specimens made from such faeces.

Two types of amoebae were cultivated and by means of ingenious technique the whole of their life history was worked out, each stage being observed under the microscope and fully described. The author next gives a detailed account of the amoebae found in the faeces of patients suffering from dysentery and points out that the best and most certain way of recognising a cell as an amoeba is to observe movements of its protoplasm.

These amoebae were generally from 25-30μ in diameter, never over 40μ; small forms also were seen 3-4μ in diameter. There was marked differentiation between the endo- and ectoplasm; the nucleus could be seen faintly and was situated eccentrically in the endoplasm. Red blood cells, bacteria, and other particles were often seen inside the amoebae. Cysts of this type of amoebae could not be recognised nor were any division forms seen. Motility was lost in from one to four hours under the most favourable conditions and when they were planted on Musgrave's media, although visible even after five days, no cysts or division forms were ever observed.

Other conclusions arrived at by the author are:—

That pathogenic amoebae are excreted very intermittently and therefore several negative results do not exclude the existence of such infection.

That the air-borne amoebae may very easily gain access to specimens of faeces or pus.

That there remained a large number of cases with dysenteric symptoms in which no definite causal factor could be recognised.

S. R. D.

CASTELLANI (Aldo). **Cases of Pseudo-Sprue probably due to a Flexner-like Bacillus.**—*Jl. Trop. Med. & Hyg.* 1912. Nov. 15. Vol. 15. No. 22. pp. 337-338.

An account of three cases all of which had the clinical symptoms of true sprue—smooth glazed tongue, frothy abundant stools of whitish colour, etc. In none could any history of dysentery be obtained. From the stools of each of these cases a bacillus having the character of *B. dysenteriae* Flexner was isolated. These organisms gave reactions practically identical with the typical Flexner bacillus, the only differences in a large series of biochemical reactions being the production of a small amount of acidity in glycerin broth, and in the case of litmus milk of persistent acidity instead of alkalinity after a primary production of acid.

The patients' serums agglutinated the organisms isolated from their faeces in the first case in dilutions of 1 in 200 and 1 in 300, in the second and third case in dilutions of 1 in 100.

The author's opinion is that these cases were not true sprue, as the first two recovered completely without leaving Colombo, such recovery being practically unknown in true sprue. Most probably the symptoms were produced by the Flexner-like bacillus.

The second case was treated with a vaccine prepared from the bacillus isolated from the faeces, with seemingly good results.

S. R. D.

GAUDUCHEAU (A.). **Recherches sur la Dysenterie (3e Note).**—*Bull. Soc. Méd.-Chirurg. de l'Indochine.* 1912. Nov. Vol. 3. No. 9. pp. 569-573.

In this note the author records his observations on the vitality of *Bacillus dysenteriae* in symbiosis with amoebae and his attempts at immunization by injecting a culture of *B. coli* into the rectum.

The author's conclusions are as follows:—

(*a*) The bacillus of dysentery remains living for a long time in certain symbiotic conditions with amoebae. This association can be compared with that of an animal and a plant. The two (bacillus and amoeba) act upon food material, bringing about a complete cyclic metabolism capable of sustaining an existence which, though persistent, is extremely feeble and sluggish at any moment.

(*b*) The dysentery bacillus inoculated under the skin of a rabbit produced local reactions, generally attenuated, when the animal had previously been treated with a rectal injection of a culture of *Bacillus coli.*

H. B. F.

JONES (Henry A.). **The Treatment of Dysentery Cases in State Institutions.**—*Jl. Amer. Med. Assoc.* 1913. Jan. 4. Vol. 60. No. 1. p. 9.

The author recommends the following treatment which he has found very successful in the treatment of cases of dysentery occurring in certain prisons and lunatic asylums. No information is given of the causes of this dysentery.

As soon as the case is diagnosed 1 gr. of calomel is given, followed by ʒ i of the following mixture every two hours:—

Acid. Sulph. dil. ʒ iii
Tinct. Cardamom Co. ℥ i
Aquam ad ℥ viii

In addition to this one tablespoonful of olive oil is given every two hours and all food is withheld.

A small quantity of brandy is given if necessary.

S. R. D.

MORESTIN (H.). **Abcès du Foie Consécutif à une Dysenterie Autochtone.**—*Bulls. et Méms. Soc. de Chirurg. de Paris.* 1913. Jan. 28. Vol. 39. No. 3. pp. 144-147.

The detailed account of a case of dysentery complicated by liver abscess in a man who had never left France. The patient, aged 36, lived in Paris, which city he had only left to perform his military service.

His dysentery had been present five months before he was admitted to hospital, when he was found to be suffering from an abscess of the liver which on being opened healed rapidly. No examinations of the stools or pus were made to ascertain if amoebae were present.

S. R. D.

SMITHIES (Franz). **The Occurrence of *Trichomonas hominis* in Gastric Contents, with a Report of Two Cases.**—*Amer. Jl. of Med. Sci.* 1912. July. Vol. 144. No. 1. (No. 484.) pp. 82-94.

Smithies, gastro-enterologist to the Mayo Clinic, Rochester, U.S.A., reports two cases of women, inhabitants of the Southern States, who came under notice for severe symptoms of a dyspeptic nature. The examination of the residue of a test-meal showed, in each instance, the presence in the gastric contents of numerous flagellate protozoa which were identified as *Trichomonas hominis*. After the comparative failure of other methods of treatment, these organisms disappeared, in each case, upon the administration of a single dose of 50 to 60 grains of thymol, given at bedtime, along with 2 grains of calomel and followed by an ounce of Carlsbad salts in the morning.

Both patients had been in the habit of drinking unfiltered surface water in the localities in which they lived.

S. R. D.

MYIASIS.

Pirajá da Silva (M.). **Nouveaux Cas de Myase dus à** *Chrysomyia macellaria* **Fabricius, à Bahia.**—*Arch. de Parasitologie.* 1912. Aug. Vol. 15. No. 3. pp. 425-430. With 2 figs. and 1 plate.

The author insists on the gravity of this disease. It can cause death within a few days. It causes great suffering to the patient with irreparable destruction of tissue and organs. The author's observations were made in August and September, and it is probable that the beginning of the hot weather is favourable to the development of the larvae of *Chrysomyia macellaria.* The infection is rather common in Bahia in persons who sleep in the open and in the sores of uncleanly individuals. Details are given of six cases. The lesions and sites of infection were: ulcer on the leg, one; abscess occipital region, one; ulcer in parietal region, one; and in three cases the larvae were in one or both nares. One of these latter proved fatal. There was haemorrhage and much very foul pus from nose and mouth. Dysphagia was marked and prevented any food being taken. The author thinks this symptom might have been caused by the presence of larvae in the pharynx or oesophagus. Unfortunately no autopsy was obtained. The cases were treated with injections of creoline solution, and, when this failed, with injections of pure benzine which always succeeded in producing expulsion of the larvae. In all the breeding out experiments the author obtained *Chrysomyia macellaria.* This fly attacks cattle also, especially young calves. Eggs are laid in the mouth or on the small sore sometimes left after detachment of the umbilical cord; wounds, *e.g.* from castration, and sores of any sort in cattle may harbour larvae.

Freire has found larvae in decomposing corpses. The bodies of small marsupials (called saruê) were left exposed in the open. They were found infected with larvae, which were bred out to the adult stage. Amongst these were species of *Sarcophaga* and *Lucilia,* especially *Lucilia eximia* Wiedmann, but some developed into *Chrysomyia macellaria.*

H. M. Hanschell.

Pieter (H.). **Un Cas de Myase Vulvo-Vaginale.**—*Rev. de Méd. et d'Hyg. Trop.* 1912. Vol. 9. No. 3. pp. 176-177.

The patient was a beggar woman 70 years old, native of St. Domingo, who scantily clothed, had slept out of doors. She was in great agony when first seen. The vulva was atrophied with prolapse of the vaginal mucous membrane, which was covered with foul smelling sticky pus in which actively moving larvae were seen. The vagina was excoriated and in places deeply ulcerated. The cervix was intact. There was no fever. Anaemia was marked and probably of intestinal origin. The larvae were recognised as those of *Chrysomya macellaria* (Fabricius, 1794). Antiseptic lotion injected three or four times a day rid the patient of the larvae in three days. The pus contained the usual flora of the vagina and a gram-positive diplococcus. The author believes that the screw worm can produce vagino-vesical and vagino-rectal fistulae; invade the uterus; perforate the vaginal walls and reaching the peritoneal cavity infect it with micro-organisms.

H. M. H.

CARTER (Henry F.) & BLACKLOCK (B.). **External Myiasis in a Monkey.** [Memoranda.]—*Brit. Med. Jl.* 1913. Jan. 11. p. 72.

Two small groups of dipterous larvae were noticed on a specimen of *Cercopithecus callitrichus* which died from acute tuberculosis the day following the observation and removal of the parasites. One batch of these larvae were taken from the nose and region of the face surrounding the mouth, the other from the right side of the body near the groin. In both cases the larvae were in various stages of development. Twenty of these parasites were removed from the host, and placed in petri dishes containing raw flesh and sand.

Sixteen specimens were of the typical *Muscid* type and the remainder larvae of *Fannia canicularis*. The majority of the larvae pupated in four days, but four specimens remained in the larval stage for eleven to thirteen days. These four specimens were separated, and subsequently three specimens of *Calliphora erythrocephala* emerged, the remaining example having shrivelled up. From the remaining puparia seven specimens of *Muscina stabulans* (identified by E. E. AUSTEN) were obtained.

Neither *Fannia canicularis* nor *Muscina stabulans* can be classed among the "flesh flies," although both have been known to occur in the alimentary tract of human beings. The natural breeding places of *Fannia* are human excrement and decaying vegetable matter, but it has been reared from the larvae of *Epischnia canella* and has been found in the nest of *Bombus*. It is possible that the larvae in question were derived from an external source, *e.g.*, the food at the bottom of the cage. However they were found on the animal itself. The monkey had been taken a considerable distance from the cage before the larvae were removed. The larvae of *Muscina stabulans* also feed on decaying vegetable substances and dung; they sometimes attack growing plants, in these cases having probably been introduced with manure. The fly has been reared from human excrement and pupae of certain insects, *e.g.*, the gipsy moth; the pupae attacked were perhaps not healthy.

H. M. H.

MISCELLANEOUS.

ANGENY (G. L.). **Gangosa.**—*New Orleans Med. & Surg. Jl.* 1912. Aug. Vol. 65. No. 2. pp. 113-120. With 3 plates.

The author has investigated the above disease in Guam, a small Pacific Island of the Marianne group, where it is very common. The term "gangosa" is derived from the Spanish word "*gangoser*" meaning "to snuffle." The disease was first studied by a Spanish Commission in 1828. Little was added to these investigations until the American occupation of the Island in 1898; since when researches have been carried out by many American observers: LEYS, who suggested the term "Rhinopharyngitis mutilans," MINK, MACLEAN, MUSGRAVE and MARSHALL, STITT, etc. The disease begins as a small indolent ulcer, often with undermined margins, on the mucous membrane of the nose, soft palate or posterior pharyngeal wall. The ulcerative process gradually spreads destroying the soft tissues, cartilage and bones; the entire nasal structure may be destroyed and in very advanced cases the entire front of the face is replaced by a large opening, ringed about by numerous foul ulcers.

The disease may attack skin surfaces, especially of uncovered regions. Its duration varies from a few months to several years. The lesions after reaching a certain stage have a tendency to slowly heal, leaving thick disfiguring scars.

Etiology.—No specific organism has yet been found. Diligent search has been made for spirochaetes but without success.

There are three theories as to the etiology of the disease:—1, that it is a distinct entity; 2, that it is tertiary yaws; 3, that it is either tertiary or hereditary syphilis.

The opinion that gangosa is a distinct entity has been reached more by process of exclusion than by any other line of reasoning. It is now accepted by most authorities. The disease is probably not a late manifestation of yaws. It is true that yaws exists in Guam, but it is also extremely common in other tropical countries where gangosa is absent. Again it is not of syphilitic origin, syphilis being unknown among the natives of Guam. Wassermann's reaction has been shown by ODELL to be positive in a large number of cases, but this reaction, as is well known, may be present in other diseases besides syphilis (yaws, leprosy, etc.). The fact that potassium iodide and salvarsan are apparently beneficial in gangosa is not a sufficient reason for stating that the disease is syphilitic—these drugs being useful in many other conditions.

According to the author the disease is steadily decreasing in Guam, thanks to the improvement in general sanitation and to the measures taken of segregating the patients in a colony until they are cured.

[Gangosa has probably a wider geographical distribution than hitherto supposed: a condition identical with, or at least extremely similar to gangosa, has been observed by SELIGMAN in New Guinea, and by CHALMERS and CASTELLANI in Ceylon.]

A. Castellani.

WOLBACH (S. B.). **The Filterable Viruses. A Summary.**—*Jl. of Medical Research.* 1912. Sept. Vol. 27. No. 1. (New Ser. Vol. 22. No. 1.) pp. 1-25.—*Boston Med. & Surg. Jl.* 1912. Sept. 26. Vol. 167. No. 13. pp. 419-426.

In this paper the author describes the diseases due to what have been called filterable viruses. The group includes many of the most important diseases of man and animals. The author defines the term filterable viruses as meaning micro-organisms which will pass through filters, the pores of which are too small to give passage to bacteria. Such filters are the well known Berkefeld filter made of diatomaceous earth and the Chamberland filter made of unglazed porcelain. The term "ultramicroscopic" is often used as synonymous with "filterable," but filterability does not necessarily mean that the virus cannot be made visible in some stage of its growth or by methods of illumination now employed. The virus of pleuro-pneumonia in cattle, for example, passes through the Berkefeld and coarser porcelain filters; yet it may be seen by direct observation with the best optical equipment, using transmitted light and a magnification of 1,500 diameters. The dark field method of illumination and the ultramicroscope further will demonstrate particles in fluid which are only a little larger than protein molecules, but as this method of illumination shows up all small particles as luminous points it becomes impossible to distinguish minute organisms, such as filterable viruses, from the myriads of particles necessarily contained in fluids available for study.

In man the following diseases have been shown to be due to filterable viruses:—Yellow fever; dengue fever; pappataci fever; typhus fever; scarlet fever?; measles; molluscum contagiosum; poliomyelitis; verruca vulgaris; trachoma.

In addition, common to man and animals are the following:—Foot and mouth disease; rabies; variola; and vaccinia. Of these yellow fever, dengue, and pappataci fever are of special interest to tropical workers.

The filterable nature of the virus of yellow fever was discovered by REED and CARROLL in 1901. The virus passes through Berkefeld and Chamberland B. filters, and is destroyed by a temperature of 55° C. in ten minutes or by exposure to air at a temperature of 24° to 30° C. in 48 hours. One attack is said to confer complete immunity. Passive immunity has not been obtained.

In dengue the virus occurs in the blood stream; it passes through Berkefeld filters which are impervious to the *Micrococcus melitensis*, but further than this its properties are still unknown.

In pappataci fever the virus occurs in the blood during the first day of the fever; it filters through a Berkefeld filter and may be preserved outside the body for three and a half days.

The author in his final summary refers to the cell inclusions to which PROWAZEK has given the name of *Chlamydozoa* and states that few pathologists and bacteriologists believe that these inclusions are parasitic. He inclines to the belief that certain of the filterable viruses are bacterial in nature, because of their resistance to physical and chemical agents, and because four of them have been cultivated. The fact that there is a group that is transmitted only by biting insects would indicate that some of them are protozoal in nature. This seems most probable in view of the filtration of protozoa which has been accomplished by BORREL and SPIEGEL. The fact that spirochaetes have been filtered suggests that certain of the diseases transmitted by intermediate hosts may be due to spirochaetes, and particularly some of the diseases of animals.

From the grouping of these diseases, which is possible with respect to the manner of transmission, localization of the virus in the tissues, and properties of the viruses in respect to physical and chemical agents, Wolbach predicts that at least some of the diseases which fall into a given group are caused by very similar micro-organisms; and that the actual demonstration of the parasite, or its culture, of one disease will mean a ready solution for others of the same group. It is quite possible that when the knowledge of filterable viruses is more complete the conception of living matter will change considerably and scientists will cease to attempt to classify the filterable viruses as animal or vegetable. The extreme minuteness of certain of these viruses, which cannot be thrown down by prolonged centrifugation with the most powerful machines, and which pass through the finest porcelain filters, suggests that some of their properties may be due to this very minuteness in size; and that like the colloid solution of metals, which behave in some respects like enzymes, a part of their activities and even pathogenic effect may be due to physical phenomena, such as surface action. The extreme minuteness may also account for the contagious nature of certain diseases, because it has been recently shown that minute particles suspended in air or liquid obey the laws which govern the diffusion of gases and of substances in solution in liquids.

G. C. L.

ROST (G.). Klimatische Bubonen. [Climatic Bubo.]—*Arch. f. Schiffs- u. Trop. Hyg.* 1912. Oct. Vol. 16. No. 20. pp. 677-693.

In this paper an interesting account of climatic bubo is given. The material for the research was obtained when the author was serving on board a German training ship in different parts of the world. In seventeen cases studied in detail the bubo was on the right side in seven, on the left side in five, on both sides in four, while in one instance the left crural glands were implicated. Suppuration was observed in three of the cases only. The different theories as to the nature and cause of the condition are given and discussed. The disease apparently varies considerably as regards its prevalence in different parts of the tropics and sub-tropics and may even show seasonal fluctuations. It is characterised clinically by a series of quite definite symptoms which enable it to be differentiated from other bubonic conditions. The most prominent of these, according to Rost, are as follows—(1) the length of the incubation time between infection and the commencement of the lymphatic swelling (two to five weeks or even in one case seven weeks), (2) the slow development of the bubo,

(3) the size, this often being enormous, (4) little inclination to periadenitis and suppuration, (5) involvement of the pelvic glands, (6) very tedious resolution.

As regards treatment, symptomatic and conservative methods are the best and resolution may be hastened by the use of X-rays. The etiology of the disease is uncertain, but the author believes that the infection is acquired by sexual connection with native women.

G. C. L.

SNOKE (Jno. H.) & STRICK (E. J.). **A Case of Suspected Pulmonary Blastomycosis.**—*China Med. Jl.* 1912. Sept. Vol. 26. No. 5. pp. 280-283.—*Jl. Amer. Med. Assoc.* 1912. Dec. 7. Vol. 59. No. 23. p. 2056.

A Chinese woman came to the Neerbosch Hospital complaining of weakness and shortness of breath. Physically she was emaciated, anaemic, and constantly coughing up a muco-purulent sputum. An area of dullness about five cm. in diameter was detected on the right side in front, above the right mammary region in the nipple line; otherwise the lungs were normal. No tubercle bacilli were found in the sputum (twenty examinations), but spore-like bodies with double refractile capsules and granules were seen. On the assumption that these were the parasites of blastomycosis BEVAN'S treatment of copper sulphate, grains 0·25 thrice daily was given. This quickly ameliorated the symptoms, the temperature coming down to normal and the constant cough being much relieved. The condition was not cured, however, as after three months of treatment the cough still persisted and the sputum contained parasites.

A historical resumé of the disease is given. In the past it has generally been confused with tuberculosis. Iodide of potassium and copper sulphate are the drugs generally employed for treatment. In the opinion of the authors these are only palliative and not definitely curative.

G. C. L.

BATES (L. B.). **The Wassermann Test in the Tropics.**—*Arch. Internal. Med.* 1912. Nov. 15. Vol. 10. No. 5. pp. 470-477.

The author concludes that malarial infection does not affect the Wassermann reaction (Noguchi modification). Cases of filariasis, yellow fever, blackwater fever and amoebic dysentery also gave negative results. The number of these tested was, however, too small to base accurate conclusions upon.

Two out of three uncomplicated cases of yaws gave positive reactions. The test was also of great value in the diagnosis of obscure cases of arthritis. When guinea-pig serum is used it is necessary to test it for native anti-human haemolysins in certain localities, and all sera in which they are found must be discarded.

G. C. L.

Castor (R. H.). Pigmented Maculae on the Body.—*Jl. Trop. Med. & Hyg.* 1912. Oct. 15. Vol. 15. No. 20. pp. 307-309.

In this paper attention is directed to the frequency of the so-called Mongolian spots,—bluish maculae, first described by Bealz in Mongolian races, and by Martinotti, Consiglio and others in Europeans. In the Burmese they are very common and are found in order of frequency on the following regions: Sacral region and buttocks, waist, arms, legs, shoulders, head, face, and neck.

They are generally multiple and the size of the patches varies from a threepenny bit or less to eight inches. They are of various shapes, the majority roundish, others oblong, others almost square. Their colour is blackish-blue, somewhat resembling that of a healing bruise; they do not disappear on pressure; are present at birth and are in the author's opinion atavistic. They generally disappear between the 3rd and 4th years. The author has found somewhat similar patches of pigmentation on the oral mucosa.

A. C.

BOOK REVIEW.

The Journal of the East Africa and Uganda Natural History Society. 1912. Nov. Vol. 3. No. 5. 66 pp. Published by Longmans, Green & Co.: London, New York, Bombay and Calcutta.

An interesting little journal, the present number containing papers on the collection and preservation of sea fish; the game of North Kavirondo; the snakes of British East Africa; preservation of natural history specimens; the Thowa river; and early man in British East Africa. Notes of topics of interest are also appended. Photographs and maps illustrate some of the articles and help to increase their value. Members of the Society are reminded that the supply of material for the journal is not as ample as could be wished and they are asked to contribute personal observations. The educative value of such a journal is a real one and the editors are to be congratulated on the success which it has attained.

G. C. L.

TROPICAL DISEASES BUREAU

TROPICAL DISEASES BULLETIN.

Vol. I.] 1913. [No. 9.

BERIBERI.

Laboratory and Experimental.

Strong (Richard P.) & **Crowell** (B. C.). **The Etiology of Beriberi.**—*Philippine Jl. of Science.* Sec. B. [*Philippine Jl. of Trop. Med.*]. 1912. Aug. Vol. 7. No. 4. pp. 271-411. With 7 plates.

In this most interesting and valuable paper the authors give a short and reasoned summary of the experiments and theories that have been put forward relating to the etiology of beriberi. It is pointed out that most of the experimental work has been carried out with birds, particularly that bearing on the production of neuritis and paralysis. The opinion of most observers is that though polyneuritis gallinarum is closely allied to beriberi in man we are not justified in saying that they are the same disease or due to the same causes. The authors therefore set themselves to show, if possible, by definitely planned and carefully carried out experiments *on man* whether beriberi, as it occurs in the Philippines, is an infectious disease or whether it is one which has its origin in disturbances of metabolism brought about by the prolonged use of polished rice as a staple diet. The experiments were carried out in the Bilibid prison where the hygienic conditions were almost ideal. The subjects of the experiment were prisoners under death sentences, in perfect health, quite free from any beriberi taint, who were entirely isolated. The reasons and dangers of the experiments were explained to the prisoners and twenty-nine volunteered. These were divided into four groups, three of the groups being allowed to mix freely with each other, except at meal times, the fourth group being absolutely isolated. A full account of the dietary and course of each case and group of cases is given.

In group (1) six cases received white rice with rice polishings for 13 days, and alcoholic extract of rice polishings for about 80 days (the men refused to eat the rice polishings after 13 days). Of these six cases two contracted symptoms of mild beriberi; four remained quite free.

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In group (2) six cases received white rice only, with other diet common to all groups, for about 100 days; of these, four contracted true beriberi, the other two showing early signs.

In group (3) white rice plus rice polishings was given for 17 days, followed by red rice for about 100 days; of this group one out of six developed rather marked symptoms suggesting beriberi.

In group (4), on white rice and the common diet, out of eleven cases four developed severe beriberi, one acute case died, and there were also two mild cases and one doubtful case. All the groups had in addition a diet of which details are given.

In none of the cases was a complete picture of beriberi obtained except those in which white polished rice formed the staple article of diet, but in one case fed on red rice the diagnosis of beriberi was made. In group (1), each member of which received 40 c.c. of unheated alcoholic extract of rice polishing (equivalent to 320 gm. of rice polishing), two cases showed symptoms of beriberi, suggesting that, whatever may be the result obtained with this extract in preventing polyneuritis in fowls and in curing the condition after it has developed, for the prevention of beriberi in adult man or for the treatment of the disease some other substances, as mongo beans and yeast, are far superior and are much easier to obtain.

The fact that four out of the six subjects of group (1) remained absolutely free from the disease shows that the extract has a preventive action; the essential ingredient is, however, only present in very small quantities, as has been shown by FUNK and COOPER. A loss of weight was present in practically all the subjects experimented on, but was generally most marked in those showing beriberi symptoms. Out of the seventeen fed on white rice as the staple diet (groups (2) and (4)), eight developed beriberi, the symptoms appearing from 61 to 75 days from the commencement of the feeding.

The authors conclude that in their experiment beriberi was produced only by means of the diet, developing owing to the absence of some substance or substances necessary for the normal physiological processes of the body, and that these substances are present in red rice, rice polishings and in small amount in alcoholic extracts of rice polishings. In some instances even when these substances are present, if there is very little variety and very few articles of food are given, and the assimilative functions of the patient are poor, symptoms of the disease may come on, such symptoms being easily dispersed by improvement in the diet. The experiments proved that the disease was not an infectious one, as groups (1), (2), and (3) mixed freely together, yet there was no tendency for the disease to spread in groups (1) and (3)—neither could it have been due to infection of the food itself. The limit of 0·4 per cent. of P_2O_5, which FRASER and STANTON have repeatedly suggested as the legal minimum for saleable rice, is believed by the authors to be too low, as cases occurred in their experiments with rice having a P_2O_5 content of ·37 per cent. If the legal limit were fixed at 0·4 per cent. P_2O_5, it would not give a sufficient margin for safety.

P. W. Bassett-Smith.

Vedder (E. B.). A Fourth Contribution to the Etiology of Beriberi. —*Philippine Jl. of Science.* Sec. B. [*Philippine Jl. of Trop. Med.*]. 1912. Aug. Vol. 7. No. 4. pp. 415-422.

In this paper the author describes a large number of fresh feeding experiments on fowls, carried out to determine the actual character of the neuritis preventing substance known to be present in rice polishings. His experiments prove that the neuritis preventing substance is a most delicate compound and that chemical manipulations with it must be most carefully carried out if it is to remain uninjured. From an experiment on fowls fed upon a carefully prepared and mixed diet he concludes that polyneuritis gallinarum does not result because of any deficiency in the ordinary food elements; and assuming that beriberi in man is a similar disease, it is apparent that beriberi may develop in men who are receiving what is supposed to be a balanced ration, provided that none of the components of that ration contain the neuritis preventing principle. Though the experiments all gave negative results, they are important to record as each additional one confirms the belief that there is a definite substance capable of preventing polyneuritis in fowls, and as each element is excluded by experiment the task of identification is simplified.

The following conclusions are given:—Neuritis in fowls is not produced by alcohol and is therefore not caused by fermentation of starches; it can develop when the diet contains a sufficiency of all the alimentary principles, provided no one of the ingredients contains the neuritis preventing substance. The neuritis preventing body is non-volatile, is destroyed by heat, is not an organic salt, fat, or proteid, and as it cannot be extracted with ether is probably not an alkaloid. It is probably an organic base as claimed by Funk, though Vedder's experiments did not actually confirm his work.

[Cooper has extracted the anti-neuritic substance from egg yolk by both alcohol and ether.].

P. W. B.-S.

Schaumann (H.). Zu dem Problem der Beriberiätiologie. [The Etiology of Beriberi.]—*Arch. f. Schiffs-u. Trop.-Hyg.* 1912. Dec. Vol. 16. No. 24. pp. 825-838.

The author states that recent research all points to the truth of the assumption that beriberi is a disease due to defective metabolic processes. In his earlier experiments certain nitrogenous bases were shown to have an important influence on the production and cure of the disease; he now suggests that perhaps other, as yet undiscovered substances, may have an important influence. Funk was the first to obtain the nitrogenous base, which he called vitamine, in sufficient quantity to use experimentally on pigeons and also to analyse it. Schaumann thinks that though the injection of ·02 – ·04 gm. of vitamine into polyneuritic birds succeeded in curing them in a short space of time, the experiment does not prove that the vitamine was the *only* active healing principle. The author vigorously repudiates the suggestion of Funk that he (Schaumann) borrowed the phosphorus theory from Fraser and Stanton. He is of opinion that researches up to the present have failed to establish the fact that an effective therapeutic and prophylactic agent can be obtained by means of hydrolysis of nucleic acid, and contradicts the statement of FUNK to the effect that phosphoric acid is contained in relatively large quantities in polished rice.

In some experiments on healthy and polyneuritic pigeons FUNK found a decrease of lipoids in the brains of the latter; the author however states that only the phosphatides and *not* all the lipoids were decreased (phosphatides Schaumann describes as phosphorus-containing lipoids).

The experiments of both show a decrease in the phosphorus content in the brains of polyneuritic pigeons and the experiments of FUNK show no decrease in the phosphorus content of starved pigeons. Schaumann therefore concludes that a decrease in phosphatides in diseased polyneuritic birds is an established fact. He also states that a bird showing polyneuritic symptoms may be cured within 24 hours by a paste made of calcium silicate and the brain of a healthy bird fed upon peas; also the injection of healthy bird serum into the breast muscles of a diseased bird will improve the condition of the paralysed subject. FUNK has misunderstood the author to say that vitamine acts as a hormone; his real meaning was that vitamine may give rise to the formation of a hormone, and that probably all vitamines act as katalysators. WIELAND's experiments on mice are not considered to be reliable. The work of SCHÜFFNER and KUENEN on the etiology of beriberi demonstrated that rice-eating nations excrete in the urine about half the amount of P_2O_5 that Europeans excrete. Beriberi patients show a still smaller excretion (0·13 gm.) which gradually increases as they progress towards convalescence; in very severe cases the phosphorus excretion remains low even after appropriate dietary changes, suggesting that it is retained.

The author states that the effect produced by the vitamines on the metabolic processes has still to be determined, as also the composition of the therapeutically active phosphorus compounds. In his opinion ship beriberi is due to a deficiency of phosphorus compounds in the diet. An alcoholic extract of yolk of egg, wheat, milk, and calves brain, soluble in ether, was found to have a prophylactic effect on mice. This is remarkable as most vitamines are insoluble in ether and shows that there may be other therapeutically and prophylactically active principles besides vitamines.

In conclusion the author says that all these seemingly contradictory results point to the fact that many questions have still to be cleared up, (1) whether we have to do with a collective effect of several related substances, and (2) whether the phosphorus metabolism is an important factor in the production of beriberi or not.

P. W. B-S.

COOPER (E. A.). **On the Protective and Curative Properties of certain Foodstuffs against Polyneuritis Induced in Birds by a Diet of Polished Rice.**—*Jl. of Hygiene.* 1912. Dec. Vol. 12. No. 4. pp. 436-462.

The author first gives a short historical account of the work done by various investigators from 1910, leading up to the isolation of the anti-neuritic substance obtained from rice polishings by FUNK. The present paper deals with the quantitative determination of the preventive powers of several common food-stuffs against polyneuritis, induced in birds by diets of polished rice, and the attempt to isolate the active constituent or constituents. A large number of experiments, using various foodstuffs, were carried out with pigeons, the details of each experiment being given. The foodstuffs he divides into three classes:—

(1) Food inefficient in preventing neuritis and loss of weight = polished rice and beef.
(2) Food efficient in both capacities = yeast, heart, and brain.
(3) Food efficient in preventing neuritis, but less efficient in maintaining body weight = egg yolk, barley, lentils.

The author summarises his conclusions under two headings to this effect:—

I.—On the distribution of the anti-neuritic substance amongst foodstuffs.

(1) The anti-neuritic body is most irregularly distributed amongst foodstuffs.

(2) Pigeons fed naturally on daily rations of polished rice of 1/20th the body-weight for the first two weeks and on much smaller rations subsequently, develop symptoms of polyneuritis three to four weeks after being placed on this diet, and lose from 10 to 40 per cent. in weight.

(3) Pigeons fed on daily rations of polished rice of from 1/11th to 1/30th the body weight develop symptoms of polyneuritis in a much shorter time (in about 14 days).

(4) As much as 20 gms. of raw beef are necessary daily to prevent polyneuritis in pigeons weighing about 350 gms.

(5) The heart muscle of the ox greatly exceeds the voluntary muscle of the same animal in its capacity for preventing polyneuritis.

(6) Sheep-brain is only about twice as efficient as beef in preventing polyneuritis.

(7) Although the addition of small amounts of brain to a diet of polished rice does not prevent polyneuritis, it is effective in almost entirely checking the loss in weight that ensues on this diet. Since birds fed exclusively on polished rice can only be maintained in body-weight by giving very large rations, it is concluded that there is a secondary deficiency in polished rice of substances essential for the maintenance of body-weight, and that these are comparatively abundant in brain.

(8) Polyneuritis is accompanied by fatty degeneration in the nervous system whether body-weight is maintained or not.

(9) The daily addition of 10 gms. of fish (hake) to the rice diet did not prevent polyneuritis and loss in weight.

(10) Egg-yolk exceeds all the other food-stuffs examined of animal origin in anti-neuritic value, three grams daily added to the rice diet being sufficient to prevent polyneuritis. Its capacity for preventing this disease is not measurably altered by boiling for four minutes.

(11) Dried lentils and unhusked barley are efficient anti-neuritic foodstuffs. Three and five grams respectively of these substances added daily to the rice diet are sufficient to prevent polyneuritis.

(12) The loss in weight induced by daily rations of polished rice equivalent to about 1/20th the body-weight can be prevented without altering the actual quantity of food given by substituting barley for polished rice to the extent of about 30 per cent. This loss in weight is therefore shewn to be due to a genuine deficiency in polished rice and is not the effect of underfeeding.

(13) One-half a gram of dried yeast daily is quite sufficient to prevent polyneuritis and also to maintain the body-weights of birds fed on polished rice.

Yeast is more efficient in preventing this disease than any of the above foodstuffs.

(14) Egg-yolk, heart-muscle, yeast, lentils and barley will be effective in the prevention of beriberi. On account of their cheapness lentils and barley will probably be the most practicable for this purpose.

(15) The relative efficiencies of the various foodstuffs in preventing polyneuritis and in maintaining the body-weights of birds fed on polished rice do not correspond. This indicates that the anti-neuritic constituent and the substances maintaining body-weight are not identical. Evidence is brought forward in the text which seems to indicate that the latter substances are not protein, fatty or lipoidal in nature.

II.—On the curative properties of extracts of various foodstuffs.

(1) MEAT.—The anti-neuritic constituent is not extracted by water and only to a small extent by ether. It is readily extracted by alcohol and after this procedure, although still insoluble in ether, is easily dissolved by water.

(2) EGG-YOLK.—The curative constituent is present in a form readily extracted by both alcohol and ether. It is not however entirely removed by the latter solvent, since an alcoholic extract of egg-yolk which has been thoroughly exhausted with ether still possesses marked curative properties. These results indicate that a large portion of the anti-neuritic substances contained in meat and egg-yolk is not combined with the fats or free (ether-soluble) lipoids, but is possibly present in the *combined* lipoids, which are only extracted by alcohol.

(3) LENTILS.—The constituent of lentils that cures polyneuritis is soluble in strong alcohol and in water, is not precipitated by basic lead acetate, and is almost entirely precipitated by ammonium molybdate. There is evidence that the active substance disappears in large quantities during the latter fractionation. It is possibly destroyed by contact with alkali.

STRYCHNINE.—Strychnine does not cure polyneuritis but prolongs the lives of pigeons affected with this disease.

P. W. B.-S.

FUNK (Casimir). **The Nitrogenous Constituents of Lime-Juice.**—*Biochemical Jl.* 1913. Jan. Vol. 7. No. 1. pp. 81-86.

In this paper a description is given of some experiments carried out by the author to determine the nitrogenous constituents of lime juice. 407 litres of commercial lime juice, in portions of 15 litres each, were precipitated with 2,800 gm. of neutral lead acetate. The precipitate was freed from lead, and concentrated in vacuo at a low temperature. During distillation crystals were separated out, which when filtered off weighed 258 gm., and were finally obtained in fine needles. The substance of which the crystals are formed belongs to the terpene group and has probably no direct relation to the scurvy problem. From the filtrate a 5 per cent. sulphuric acid solution was made, and then a 50 per cent. phosphotungstic acid solution was added until precipitation was complete. From this precipitate were obtained (1) Substances of the purine group, (2) Substances of pyrimidine base, (3) Substances of the choline group.

A chemical analysis was made of these three groups and is described; from the latter a final product of yellow needle-like crystals was obtained, similar in its formula and properties to a substance described by v. BRAUN (1908) as platinichloride of methylpiperidylacetic betaine. Further investigations are being made.

P. W. B.-S.

FUNK (C.). **Further Experimental Studies on Beriberi. The Action of certain Purine- and Pyrimidine-Derivatives.**—*Jl. of Physiology.* 1913. Feb. Vol. 45. No. 6. pp. 489-492.

In earlier papers the author was able to show that a substance may be isolated from rice-polishings, yeast, milk and bran, which has a curative effect on birds suffering from polyneuritis, the chemical properties of which suggested that it belonged to the pyrimidine group.

Attempts to simplify the method of extracting this substance were not successful, but a substance named allantoin was obtained which was found not to cure neuritic birds, but to retard their death for several days.

The experiments described in this paper show that a number of purine and pyrimidine substances possess a very marked action on neuritic birds, being able to replace some of the physiological functions of beriberi-vitamine, also that pigeons are not able to convert uric acid into allantoin. Further experiments are being carried out.

P. W. B.-S.

GLOGNER (Max). **Die Nahrungsmitteltheorien über die Ursache der Beriberi in kritischer Beleuchtung.** [The Food Theories of the Cause of Beriberi.] 56 pp. 8vo. 1912. Leipzig: J. A. Barth.

In a monograph of 56 pages the author has set out very fully the points for and against deficiency or changes in the food supply being the cause of beriberi. From a very long experience in the Dutch East Indies he has convinced himself that polished rice or other changes in food are not the cause. At the outset he states: "No observer has yet been able to demonstrate the presence of a definite poisonous substance, or the absence of definite dietary constituents as the cause of that form of polyneuritis which can be produced in animals." [It is evident that the author has not yet seen the late work of FUNK, SCHAUMANN, and others.]

He considers that experiments on animals are not analogous to what occurs in man, and that denaturalising the food by cooking at a high temperature probably produces poisonous albuminous substances, which exert a direct toxic effect upon the animals under observation. He states that rice pericarp is useless as a prophylactic, and that the Dutch East Indian Government no longer insists on its use. He does not consider that the amount of P_2O_5 is of any importance, but is inclined to admit that there is a possibility of the presence of a substance called by SCHAUMANN "Activator" which may be of use; though this greatly discounts the P_2O_5 theory. The germ theory and deficiency theory are, according to him, impossible; his own view being that beriberi is a multiple neuritis occurring as a sequela of other diseases, notably malaria. Finally he agrees with neither EIJKMANN, FRASER, nor SCHAUMANN, and is most particularly opposed to the latter.

P. W. B.-S.

EPIDEMIOLOGY.

LOVELACE (Carl). **The Etiology of Beriberi.**—*Jl. Amer. Med. Assoc.* 1912. Dec. 14. Vol. 59. No. 24. pp. 2134-2137.

The author gives a description of a form of peripheral neuritis met with during the construction of the Madeira-Mamoré railway in the states of Amazonas and Matto Grosso, Brazil. The disease was at first believed to be a sequela of malaria, but is now recognised as a form of beriberi; among the 30,430 admissions to hospital in four years 963 cases were diagnosed as this form of polyneuritis. It affected the better classes as well as the coolie labourer, was most frequent in the second half of the year, and showed marked evidences of frequency in certain houses. In a period of five months in 1909-1910 three men employed as night watchmen in the hospital died of beriberi, a fourth was invalided home, while a considerable number of orderlies, one of the cooks, two of the nurses, and two of the hospital physicians were attacked. The rate of incidence in the tug boats on the river also was very high. A good and varied diet, rich in meat, had been supplied to all these cases, rice either being absent or only forming a small part of the ration. The elimination of rice from the diet of the employees did not lessen the incidence of the disease. Clinically the cases were divided into *A. Acute*—(1) Those in which cardio-vascular symptoms predominated, including the pernicious forms characterised by anasarca, rapidly developing dyspnoea, cyanosis, and death. (2) Those who had paralysis of various groups of muscles, with pain and tenderness along the nerve trunks, showing the characteristic features of multiple peripheral neuritis. *B. Chronic*—The patient generally walked into the hospital complaining of swelling of the legs and soreness of the calves, and had a rapid pulse; the knee jerks were usually exaggerated, but frequently lost, and there were areas of hyperaesthesia and anaesthesia. Fully three-fourths of the cases presented these symptoms only. The mortality was 15·6 per cent. The pathological lesions were not characteristic—wasting of muscles, serous effusions, right-sided cardiac dilatation, and congestion or malarial changes of spleen and liver were found. The nerve changes were not investigated. The following conclusions are given:—

"(1) A fatal form of peripheral neuritis occurs among residents of the Madeira Valley, and among the employees of the Madeira-Mamoré railway. This neuritis must be classified as beriberi, or as a member of an, as yet, hypothetical beriberi group.

"(2) This disease bears no intimate relation to the consumption of rice, polished or unpolished, as a staple article of diet.

"(3) This disease is not due to the absence of protein in the diet of those whom it attacks."

P. W. B.-S.

VEDDER (E. B.). **The Etiology of Beriberi.** [Correspondence.]—*British Med. Jl.* 1912. Dec. 21. p. 1731.

This is a comment on a note by BROWNING (H. G.) in the *British Medical Journal* of July 13th, 1912 on "the Etiology of

Beriberi" reported in this *Bulletin* No. 3, p. 168. Vedder points out that the probable cause of the engine-room staff developing beriberi while the deck hands who were on the same diet remained free, was not the dampness of their quarters, but rather depended upon the more exhausting work of the former. The metabolism of the nervous tissue of the engine-room crew would be more active than in the case of the deck crew, and a much larger supply of the essential vitamine would therefore be required by the former. A diet which might contain sufficient vitamine to maintain the deck crew in health might be quite insufficient for the engine-room crew.

P. W. B.-S.

i. CREEL (R. H.). **The Public Health Aspect of Beriberi.**—*New Orleans Med. & Surg. Jl.* 1912. Sept. Vol. 65. No. 3. pp. 197-206.

ii. WELLMAN (C.), BASS (C. C.), & EUSTIS (A. C.). **Investigation of Louisiana Rice with Reference to the Etiology of Beriberi.**—*Ibid.* pp. 191-196.

iii. SWAN (J. M.). **Summary of the Literature on the Etiology of Beriberi.**—*Ibid.* pp. 185-190.

i. The author states that the incidence of beriberi in the confines of the continental United States has been of such infrequency that the disease does not constitute a public health problem. Cases have occurred in comparatively small sporadic outbreaks in the last twenty to thirty years, several being in State Asylums and Penitentiaries. He gives a review of the distribution of the disease in the Western and Eastern Hemispheres, and describes in more detail the prevalence of beriberi in the Philippines. The enormous mortality caused by it in Manila, 656 per 100,000 in 1910-11, was shown by ANDREWS to be chiefly due to infantile cases. The data obtained show that beriberi occurs chiefly among rice-eating people, that it has increased among these as machine-milled rice has taken the place of hand-milled rice, and that in Manila the mortality during the last eight years has been double that of cholera. The author gives a review of the prophylactic work that has been done; he is strongly in favour of a legal standard of P_2O_5 being fixed and enforced; and for the prevention of "ship beriberi" advises the application of laws forbidding overmilled rice in rations for the crew and necessitating a generous supply of beans or other lentils.

ii. In this paper the authors describe some work done to determine whether or not the experimental results obtained by various writers with polished rice of the Orient could also be obtained with rice grown in Louisiana. Two forms of the grain were obtained, one unpolished and a second highly polished. The results of feeding experiments on hens with these two forms were practically in accord with those obtained with oriental rice—as described by FRASER, SCHAUMANN and others. They also found that an exclusive diet of cane sugar produced neuritis more rapidly and completely than polished rice; if birds were fed only on pure corn starch, the same symptoms developed more slowly. The authors state that further experimental work is being carried out.

iii. The author gives a short general historical summary of the recent literature on the etiology of beriberi up to the end of 1911.

P. W. B.-S.

SMITH (F.) & HASTINGS (A. E. F.). **Multiple Neuritis among Soldiers in Calcutta and Vicinity—an Endemic, Epidemic, Seasonal Disease resembling Beri-Beri.**—*Jl. R. Army Med. Corps.* 1913. Feb. Vol. 20. No. 2. pp. 202-205.

This is a short paper, in which attention is drawn to the fact that there has been a moderate prevalence of polyneuritis among the European troops at Calcutta in the last four years, during the autumn months when the weather is very hot and damp. From the year 1909 there were 7, 3, 10 and 6 cases annually at Calcutta, and 50 cases occurred at Lebong in the Darjeeling hills in 1911. The curious fact is noted that in 1911 the Lebong cases were sent down to Barrackpore to convalesce, and that in 1912 the disease appeared among the European troops stationed there. The dietary of the men is said to have been ample and varied. Sporadic beriberi and epidemic dropsy are known to occur among civilians and natives of Calcutta, but the authors could not find any evidence to show that rice or alcohol played any part in the causation of these beriberi-like cases. among the European troops.

[Further information of the Lebong epidemic would be of interest, when possibly the cause of the epidemic might be traced].

P. W. B.-S.

MCLAUGHLIN (Allan J.). **Beriberi in Infants.**—*Jl. Trop. Med. & Hyg.* 1912. Dec. 16. Vol. 15. No. 24. pp. 370-371.

In this paper a short review is given of the work of CLARK, HIROTA, ANDREWS, CHAMBERLAIN, VEDDER, and the author on the disease in children known now as infantile beriberi and recognised in the Philippines under the term "taon." The author draws attention to the conclusions arrived at by ANDREWS (see this *Bulletin* No. 3, p. 166-167). He emphasises the fact that the children can be cured, either by treatment of the mother while suckling the child, or by administering extracts of rice polishings direct to the child. Finally he points out the importance of reducing the amount of polished rice brought into the country, if this excessively high infant mortality in the Philippines is to be prevented. A small tax on imported white rice is recommended.

P. W. B.-S.

CHEVALLIER (C. L.). **Report on Beri-beri at Serenli, East Africa Protectorate, December, 1911, to May, 1912.**—Report to the Secretary of State for the Colonies. Received in Colonial Office, Nov. 20, 1912.

A description of a disease closely resembling beriberi is given. The symptoms were, oedema with pitting on pressure of the outer side of the upper third of the tibia or between that bone and the fibula; pain in the thigh muscles, especially the adductors, followed by similar changes in the calf muscles; early loss of the patellar knee reflex; sudden cardiac and gastric symptoms, these being quickly followed by a fatal termination. Cases of moderate severity appeared to be rare and no typical wet or dry cases as described in the text books were seen. In the later stages marked though not complete anaesthesia of the lower limbs was present; persistent vomiting and retching nearly always set in some hours or a day or two before death. The mortality was high, 44 deaths among the 112 cases, including 25 women with three deaths.

Measures were taken to cope with the epidemic which commenced in November 1911; rice was stopped early in December and the diet was improved, a liberal ration of meat being issued. The change did not however appear to have any effect on the course of the disease, as cases occurred one, two, and three months later, the largest number with the heaviest mortality, for example, being noted at the end of February 1912.

The author concludes that it is impossible to study an epidemic like this without feeling strongly that a germ is, or has been, at work as a cause of the disease. He mentions that heat, damp and overcrowding were present, all of which he believes favoured the spread of the disease.

G. C. Low.

MALARIA.

VON EZDORF (R. H.). **Malarial Fevers—Prevalence and Geographic Distribution in Alabama.**—*U.S. Public Health Rep.* 1912. Dec. 27. Vol. 27. No. 52. pp. 2181-2189.

It is shown in this investigation that all forms of malarial fevers prevail in the State of Alabama. During the month of September 1912 the reports indicated that one person in every fifty of the population suffered from an attack of malarial fever and during October one person in sixty-seven. The types of infection, in the order of prevalence, were tertian, aestivo-autumnal, and quartan. The chronic type of malarial infection is proportionately more frequent in the coloured race than in the white.

J. G. Thomson.

KENRICK (W. H.). **Malaria in India and the Birth and Death-Rate.**—*Lancet.* 1913. Jan. 25. pp. 233-234. With 4 text-figures.

The author states that a malarial epidemic causes a great reduction in the total number of births in the following year. This reduction begins nine months after the commencement of the epidemic, and reaches its maximum exactly nine months after the epidemic attains its maximum. Endemic malaria, on the other hand, causes no reduction in the yearly birth rate of places in which it prevails, compared with the rate of neighbouring healthy areas. It has however a marked effect upon the monthly distribution of births. With regard to the death-rate ROGERS found that 25 per cent. of the total fever mortality in a highly malarious district of Bengal might be ascribed to malaria, and ROSS estimates the true malarial death-rate of Mauritius to average about 20 per 1,000 per annum. The author compares a group of 34 healthy villages (average spleen rate 4 per cent.) with a group of 33 hyperendemic villages (average spleen rate 80 per cent.) and concludes that the malaria of the hyperendemic group caused an average increase of 12 per 1,000 in the general death rate of the group. The mortality of malaria falls most heavily on the young children aged from 2 to 8 years.

David Thomson.

ARENA (Guido). **Sindrome Cerebellare da Malaria.**—*Riforma Medica.* 1913. Feb. 1. Vol. 29. No. 5. pp. 113-122. With 6 graphs.

The author describes at length an unusual case of malignant tertian malaria, complicated by a peculiar complex of nervous symptoms, which in his opinion were undoubtedly produced by cerebellar disturbance of pernicious malarial origin. The chief features in this complex of nervous symptoms, which he terms a cerebellar syndrome, were asthenia, atony, astasia, tremors, astasia-abasia*, nystagmus, and diminution of muscular tone. This peculiar case differs from those allied cases described by PANSINI, RUMMO, BEVACQUA, etc., in that there were no grave symptoms such as dysarthria or anarthria and no psychic disturbances. Also the graphs of the tremor show characteristic features sufficient to differentiate it from that met with in other nervous complexes, and finally the case differed from the others in that antimalarial treatment resulted in a very marked improvement of all the symptoms.

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* BLOCQ's definition of this term is as follows: "A morbid state in which the impossibility of standing erect and walking normally is in contrast with the integrity of sensation, of muscular strength, and of the coördination of the other movements of the lower extremities." (OSLER's *Principles and Practice of Medicine*, 1912, 8th Edit., p. 1119.)

D. T.

KAUFMAN (Bernard). **A Case of Apoplectic Malaria.**—*New York Med. Jl.* 1913. Feb. 1. Vol. 97. No. 5. p. 243.

A case of aestivo-autumnal malaria (parasites identified) in a boy aged 14 is recorded. The boy was quite conscious at 7 a.m. In less than an hour he was apparently asleep, but could not be roused. The author was called in at 9 a.m. and found the boy still unconscious with stertorous breathing. The temperature gradually rose to 107° F. Hypodermic injections of quinine (10 grains to 40 minims of water) were given. The patient regained consciousness next day and eventually recovered.

The skin sloughed at each of the sites of injection, so that the author advocates the use of a much more dilute solution for hypodermic administration.

D. T.

RYAN (J. Charles). **A Case with Comments. Sub-Tertian Malarial Fever complicating Pregnancy.**—*Practitioner.* 1912. Dec. Vol. 89. No. 6. (No. 534.) pp. 871-873.

The author describes a case of sub-tertian malaria complicating pregnancy in a European lady in West Africa. He gave small doses of quinine at long intervals in accordance with the prevalent belief that quinine is contraindicated in pregnancy. These small doses had no effect on the malaria, so that he gave 10 grains of quinine thrice daily with bromide of potassium in similar doses. She recovered quickly from the malaria under this treatment and took 5 grains of quinine daily afterwards as a prophylactic. Eleven weeks later she had a normal labour and a vigorous child was born.

He concludes that it is futile to attempt to combat malignant malaria with small doses of quinine; and that moderate doses of potassium bromide exercise probably some control over the ecbolic tendency of quinine. The foetus survived though the pyrexia was sudden, severe and repeated. The evidence is against the general belief that pregnancy in a European residing in a malarious country contraindicates the use of quinine as a prophylactic.

D. T.

LAVINDER (C. H.). **A Note on the Cultivation of Malarial Plasmodia after the Method of Bass and Johns.**—*Jl. Amer. Med. Assoc.* 1913. Jan. 4. Vol. 60. No. 1. pp. 42-43.

The author, following the technic of BASS and JOHNS, tried to cultivate malarial parasites from three cases.

He first attempted to grow *Plasmodium falciparum*, but growth evidently ceased before segmentation occurred. An attempt to grow *P. malariae* also failed. Another attempt to grow *P. falciparum* proved successful and the parasites in two tubes went on to sporulation, but the merozoites did not enter fresh blood cells. The author was thus able to confirm the work of BASS and JOHNS by cultivating the malignant tertian parasite for one generation. Scarcity of malarial cases has prevented further experiments.

J. G. T.

ZIEMANN (Hans). i. **Ueber die Bassсhe Kultur der Malariaparasiten in vitro und die daraus sich ergebenden Resultate.**—*Centralbl. f. Bakt.* 1. Abt., Orig. 1913. Jan. 11. Vol. 67. No. 6. pp. 482-489.

ii. **Ueber die künstliche Weiterentwicklung (in vitro) des Tertian-Malariaparasiten.** [On the Development in vitro of Malarial Parasites.]—*Deut. Med. Wochenschr.* 1913. Feb. 6. Vol. 39. No. 6. p. 260.

i. The author received eight slides from BASS, a series taken from cultures of the malignant tertian parasite between 5½ and 48 hours. Ziemann gives a very full description of these and says they illustrate the process of development up to segmentation.

ii. He has also attempted to cultivate the benign tertian parasite after BASS's method. He succeeded in so far as he got half to three-quarter grown benign tertian parasites to sporulate in vitro. This occurred also in tubes to which ascitic serum had been added to the column of the patient's serum. No growth took place in the tubes which contained no glucose.

D. T.

JOUKOFF (N. M.). **Culture du Parasite de la Malaria.**—*Compt. Rend. Soc. Biol.* 1913. Jan. 24. Vol. 74. No. 3. pp. 136-138.

The author has attempted with considerable success to cultivate in vitro the sexual phase of the malarial parasite, as it occurs naturally in the anopheles mosquito.

Technique:—10 cc. of malarial blood was placed in four sterile tubes. To each was added ½ cc. of sodium citrate 10 per cent. Two tubes were heated to 41° C. and two to 44° C. for half an hour. These were then incubated at a temperature of 25° to 26° C. No change was noted in the tubes heated to 44° C., but in the tubes heated to 41° C. the first stages of the sexual cycle were obtained, viz.: fertilised gametes and ookinetes. The culture remained alive for 3 days.

A second experiment was made with the blood of a case of *Plasmodium malariae*. To the tubes heated to 41° C., 1½ to 2 cc. of LOCK's serum was added to 4 or 5 cc. of citrated blood. With this technique the tubes exhibited not only conjugation but also the ultimate segmentation of the fertilised elements. On the sixth day of the culture, a large number of sporozoites were found, from forms not completely divided to forms completely mature and free. The phases met with differed somewhat from those found in the stomach of the anopheline mosquito.

D. T.

CRESPIN (J.) & BEGUET (M.). **La Courbe de l'Hémolyse dans le Paludisme. (Considérations Physio-Pathologiques.)**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 801-805.

The authors think that the pathology of acute and chronic malaria is little known in all its details, and that more research should be done on this subject. They found that the resistance of the red corpuscles is generally diminished in malaria. In a case of intermittent fever, the resistance of the corpuscles decreases during the rigor and the attack of fever. After the attack is over it again increases until the commencement of the next attack. It is during this attack that the corpuscular destruction takes place, but perhaps only in certain parts of the body, notably in the spleen and not in the peripheral blood. Punctures of this organ made at this time would let one know if the spleen of the malarial subject contained any iso- or autolysins.

D. T.

MANOILOFF (E.). **Weitere Erfahrungen über Idiosynkrasie gegen Brom- und Chininsalze als Ueberempfindlichkeitserscheinungen beim Kaninchen and Meerschweinchen.** [Further Experiments on Idiosyncrasy towards Salts of Bromine and Quinine, as Symptoms of Hypersensitiveness, in the Rabbit and Guinea-pig.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1913. Jan. 23. Vol. 67. No. 7. pp. 540-544.

This article describes a successful attempt to produce passive anaphylaxis with the serum of animals which had been given salts of quinine and bromine for a long period of time. The author used well-developed rabbits and guinea-pigs which received the same food under the same circumstances. He gave them intraperitoneal injections of quinine or bromine salts daily until the animals were able to stand without bad effects otherwise lethal doses. He then bled one of these animals, obtaining about 10 cc. of activated serum, and injected it intraperitoneally or intravenously into another rabbit or guinea-pig which had not been treated with these salts. 48 hours and sometimes even 14 days after the injection of the serum, an injection of bromine or quinine salts respectively produced typical anaphylactic symptoms. The experiments were much more positive in the case of the quinine salts than with the bromine salts.

D. T.

Facciola (Luigi). **Sul Parassita dell'Infezione Malarica. Ricerche Ematoscopiche.**—*Il Morgagni.* (Archivio. Pt. 1.) 1912. July. No. 7. pp. 256-266.

The author describes at length a species of coccus which he has found in the blood of malaria patients. He apparently doubts the generally accepted cause of the disease.

D. T.

Ruge (Reinhold). **Malariaparasiten.**—*Handbuch der pathogenen Mikroorganismen.* [Herausgeg. v. Kolle (W.) & Wassermann (A. von).] 1912. 2nd Edit. Vol. 7. pp. 167-320. With 3 plates and 82 text-figures. Jena: Gustav Fischer.

This monograph deals with malaria in all its aspects, without specialising on any one point. The author gives most of the up-to-date knowledge on geographical distribution, epidemiology and prophylaxis, as well as a thorough account of the parasite in the mosquito and in the human host. In addition he gives a description of the technique in making blood preparations and in dissecting mosquitoes. The illustrations are numerous so that it should be a very suitable and useful handbook for students. The bibliography is good, though it is not quite up to date regarding crescents. The illustrations on the whole are satisfactory, although there is room for considerable improvement in the tint of the coloured figures and plates.

D. T.

BLACKWATER FEVER.

Graham (W. M.). **Report on Blackwater Fever in Southern Nigeria 1899-1911.** 72 pp. With 4 plates, 4 charts and a map. 1912. London: Printed by Waterlow & Sons.

In this report the author gives data regarding 240 cases of blackwater fever occurring in Southern Nigeria 1899-1911.

He begins by discussing some of the hypotheses regarding blackwater fever:

(1) He considers that the theory that blackwater is simply an attack of pernicious malarial fever, with bilious and haemoglobinuric symptoms, is untenable.

(2) In the cases of blackwater which he has seen the onset of haemoglobinuria has been preceded by quinine.

(3) He states that if malarial fever prepares the ground for the production of blackwater fever, the incidence and severity of the latter should bear some direct ratio to the incidence and severity of the former, but this relation he believes is negatived by his data.

He considers that if the alleged close relation between blackwater fever and intense malaria be maintained then the apparent immunity to blackwater fever displayed by the negro infant will require explanation. The West African coast towns are certainly foci of intense malaria; 100 per cent. of the negro infants suffer from the disease. These are non-immune up to the age of puberty and accepting the hypothesis of malarial origin it is difficult to offer an explanation of this fact.

(4) Difficulties in regard to blackwater fever as a specific disease, due to a specific organism.

(*a*) A specific organism should be found present in all cases.

(*b*) The disease would require to have an incubation period varying between 6 and 10 months to satisfy the conditions imposed by the available records.

(*c*) One attack ought to confer some immunity.

(*d*) The disease should occur among the natives of the colony.

(*e*) The data would seem to indicate that, if it is a specific disease, it is not transmitted by domestic utensils or by parasites. But it might be transmitted by direct personal contact. In these colonies the opinion is very commonly held by non-medically educated Europeans that blackwater fever is frequently caused by habitual sexual relations with native women.

(*f*) If it is a specific disease, cases should occur occasionally in sequence in the same place or among associates. This sequence is well marked in all the available official returns.

The data show that blackwater fever is more common and shows a higher death rate among the official than among the non-official Europeans. The author thinks that this is because the average age of the official European is higher than that of the non-official.

The author has data of six cases of blackwater fever in negro inhabitants in Southern Nigeria in the period 1907-11.

His tables show that the years of severe malarial incidence do not show a corresponding increased incidence of blackwater fever, but on the contrary a decreased incidence is usually shown.

Microphotographs of sections of the kidneys and the liver in cases of blackwater fever accompany the report; also four charts showing the marked correlation between the temperature, pulse rate and the amount of haemoglobinuria; and finally a map shewing the distribution and sequence of cases of blackwater fever in the colony.

David Thomson.

BALFOUR (Andrew). **A Case of Blackwater Fever showing the Cell Inclusions of Leishman.**—*Jl. Trop. Med. & Hyg.* 1913. Feb. 1. Vol. 16. No. 3. pp. 35-38. With 1 plate.

The author examined blood films from a case of blackwater fever in Khartoum and found the cell inclusions and chrome cells described by LEISHMAN. He also examined the blood by the dark-ground method but was unable to detect any spirochaetes. He is inclined to believe in SCHILLING-TORGAU's explanation of the origin of these granules. They differ from the spirochaetal inclusions in the red cells which he has described in Sudanese fowls.

Twenty cc. of citrated blood from this patient was injected into a monkey, but it did not afterwards exhibit any signs of the disease. Balfour is inclined to the belief that blackwater fever is more a "symptom complex" than a well defined disease, and is probably due to the special action of depressing influences exerting themselves along with the malarial toxin.

He also puts forward the suggestion that blackwater may be caused by the injection of a highly virulent haemolysin by some insect.

D. T.

WERNER (H.). **Ueber Cholestearin und Glyzerin beim Schwarzwasserfieber.** [Cholesterin and Glycerin in Blackwater Fever.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1913. Jan. Vol. 17. No. 1. pp. 8-11. With 2 curves.

The author administered cholesterin to a patient who showed a tendency to develop haemoglobinuria when quinine was given; no increase of tolerance to the quinine resulted. In another case of malaria where 10 cc. of glycerin were given as an enema, for constipation, an attack of haemoglobinuria was precipated. This second case also showed a predisposition to blackwater fever.

J. G. Thomson.

YOFÉ (Hillel). **Traitement Préventif des Fièvres Hémoglobinuriques.**—*Rev. de Méd. et d'Hyg. Trop.* 1912. Vol. 9. No. 3. pp. 166-173.

Yofé points out that an attack of blackwater fever is very often associated with the administration of quinine; since this fact has become well known to the medical world, the author has only had three cases of haemoglobinuric fever in which quinine could not be held responsible for the attack. The first patient was an Arab child who had never had quinine, the second had taken a dose of methylene blue, 0·15 grammes, three hours before the onset of haemoglobinuria, and the third, a young girl, had taken methylene blue one hour before the attack. In a series of 46 cases of blackwater studied by the author during the last six years the three quoted above are the only ones where quinine could be entirely excluded.

In view of the fact that certain persons show this peculiar idiosyncrasy to quinine, the necessity of keeping a careful watch for those patients to whom it is dangerous to administer the drug is pointed out.

The author lays stress on the following points:—

(1) The danger of blackwater is much less if quinine is given by intramuscular injections, although this form of administration does not always prevent it. (2) The time of the administration of the drug is also of importance. If the quinine is administered during the fall of the temperature the danger of blackwater is lessened. Quinine ought not to be given during the rise of temperature. Atoxyl by injection proved useful in the treatment of a young girl who was unable to take quinine without developing haemoglobinuria. Where quinine proved dangerous methylene blue and aristochin were tried.

The following table shows the amount of blackwater fever occurring at Zicron, Palestine, and neighbourhood from 1907-1912.

Year.	No. of cases of blackwater.	Deaths.
1907	12	3
1908	8	1
1909	9	2
1910	14	4
1911	2	0
1912	1	0

In conclusion the author is perfectly convinced that in a malarious district it is possible by thorough quinine prophylaxis to reduce haemoglobinuric fever to a minimum.

J. G. T.

PROTOZOOLOGY.

ALEXEIEFF (A.). **Quelques Remarques à propos de la Spécificité Parasitaire. Sur le Véritable Nom de *Cryptobia* (= *Trypanoplasma*) *intestinalis* et sur celui du Trypanosome Pathogène des Mammifères: quelques autres Questions de Synonymie chez les Protozoaires.**—*Zoologischer Anzeiger.* 1912. Nov. 26. Vol. 41. No. 1. pp. 17-36. With 3 figs.

This interesting and somewhat unconventional paper cannot be summarised in full owing to lack of space, but those interested should consult it in the original.

The author considers that the idea of "absolute parasitic specificity" is quite wrong, that is, that it is incorrect to describe a species of parasite as new because it happens to be found in a new host. He states that this idea is "not only inexact, but is even very harmful and contrary to the development of comparative parasitology." Two principles should be considered in general parasitology, namely, (1) that a single species of parasite can be harboured by different hosts, and sometimes these hosts are far removed from one another in zoological classification; (2) that a single host can harbour two or more neighbouring species of parasites. A "third premise" is that a morphological criterion alone is necessary and sufficient to distinguish species, as physiological and physico-chemical modifications react on the morphology of a parasite. The author also wishes to adopt a rule that no species should be accepted unless it is accompanied by differential diagnosis and figures which permit of it being distinguished from neighbouring species. As he points out, this is followed among Metazoa and ought to apply equally for Protozoa.

Certain Protozoa are then considered and their synonymy discussed, thus:—

(1) *Cryptobia dahli* (Möbius, 1888) = *Diplomastix dahlii* = *Trypanoplasma intestinalis* = *Tr. ventriculi* = *Tr. congeri* = *Heteromita dahlii* = *Cryptobia intestinalis.*

This flagellate occurs in the digestive tract of certain fishes, e.g., *Cyclopterus lumpus, Box boops, Conger niger, Motella tricirrata.*

(2) *Cryptobia borreli* (Laveran et Mesnil, 1901) = *Trypanoplasma borreli* = *Tr. cyprini* = *Tr. varium* = *Tr. gurnei* = *Tr. abramidis* = *Tr. gurneyorum.*

The parasite occurs in the blood of various fishes, of which the author gives a list.

(3) *Cryptobia helicis* (Leidy, 1846) = *Cryptoicus helicis* = *Bodo (Cercomonas) helicis* = *Trypanoplasma helicis.*

The parasite is found in the seminal receptacles of certain snails.

(4) *Cryptobia* (*Trypanophys*) *grobbeni* (Poche, 1903) = *Trypanosoma grobbeni* = *Trypanophys grobbeni.*

[The parasite is found in certain Siphonophores.]

(5) *Trypanosoma evansi* (Steel, 1885) = *Trypanosoma brucei* = *T. gambiense* = *T. rhodesiense* = *T. dimorphon* = *T. congolense* = *T. frobeniusi* = *T. pecaudi* = *T. cazalboui* = *T.*

vivax = *T. soudanense* = *T. togolense* = *T. equiperdum* = *T. equinum* = *T. hippicum* = *T. venezuelense*.

[The author considers that these are "physiological races," but has he not confused monomorphic forms like *T. vivax* with polymorphic forms like *T. gambiense*?].

(6) *Trypanosoma lewisi* (Kent, 1882) = *Schizotrypanum cruzi* = *Endotrypanum schaudinni* = *T. legeri* = *T. duttoni* = *T. blanchardi* = *T. cuniculi* = *T. rabinowitschi* = *T. myoxi* = *T. microti* = *T. avicularis* = *T. theileri* = *T. franki* = *T. himalayanum* = *T. indicum* = *T. falshawi* = *T. muktesari* = *T. americanum* = *T. wrublewskii*.

Alexeieff goes further and writes "one ought to ask if *T. lewisi* itself does not belong to the species *T. rotatorium* (Mayer)?"

(7) *Crithidia lesnei* (Léger, 1903) = *Herpetomonas lesnei* = *Trypanosoma drosophilae* = *Rhynchoidomonas* (pro *Rhynchomonas*) *luciliae* = *Leptomonas muscae domesticae* pro parte = *Cystotrypanosoma intestinalis* = *Herpetomonas muscae domesticae* pro parte.

The author states that "true trypanosomes are not known in non-biting insects, and it is very probable that they do not exist in them." "The trypanosomes are parasites peculiar to the blood of vertebrates."

(8) *Leishmania*. The author states that this genus is not "autonomous." *Leishmania* represents a stage in the development of *Trypanosoma* (*T. lewisi*). The "leishmanioses" are then only trypanosomiases. The genus *Leishmania* cannot be placed in that of *Herpetomonas*. There is no *Herpetomonas* in vertebrates, just as there is no *Trypanosoma* in invertebrates. [But *Leishmania* in culture develops into a herpetomonad, not a trypanosome].

(9) *Sarcocystis miescheriana* (Kühn, 1865) = *Synchytrium miescherianum* = *Sarcocystis* (*Gregarina*) *lindemanni* = *S.* (= *Miescheria*) *muris* = *S.* (= *Balbiania*) *mucosa* = *S. tenella* + *Balbiania gigantea* = *S. hominis* = *S. blanchardi* = *S. bertrami*.

The author states that there is only one species of Sarcosporidia.

(10) *Dimastigamoeba gruberi* (Schardinger, 1899) = *Amoeba gruberi* = *A. punctata* = *Vahlkampfia punctata* = *Nägleria punctata*.

These are amoebae of the *limax* group with flagellispores.

At the beginning of his paper the author states, in a footnote, that the *Entamoeba* (*E. aulastomi*) described by Nöller (1912) in the leech *Haemopis sanguisuga* (= *Aulastomum gulo*) is *E. ranarum*.

H. B. Fantham.

Nöller (Wilhelm). **Die Blutprotisten des Wasserfrosches und ihre Uebertragung. (Vorläufige Mitteilung).** [The Blood Protists of the Frog and their Transmission.]—*Arch. f. Protistenkunde*. 1913. Jan. 22. Vol. 28. No. 2. pp. 313-316.

Nöller's paper is a preliminary account of what promises to be most interesting results of his investigations on the blood parasites of frogs (*Rana esculenta*). He worked at a pisciculture institute at Dörnfeld-Gräfinau, on the Ilm, in Thuringia.

The parasites observed were *Trypanosoma rotatorium* Mayer, *Dactylosoma splendens* Labbé, *Lankesterella minima* Chaussat (= *L. ranarum* Lankester) and *Cytamoeba bacterifera.*

(1) *Trypanosoma rotatorium.*—Nöller gives a brief historical outline and states that the trypanosome cannot be transmitted from frog to frog by *Helobdella algira* in Germany, though FRANÇA found that to be the case in Portugal, since the leech does not occur in Germany. *Hemiclepsis marginata* is the transmitter and in its stomach both unchanged and developmental forms of the flagellate occur. Nöller states definitely that *H. marginata* transmits *T. rotatorium* from tadpole to tadpole. He is not certain if *Piscicola geometra* has any share in the transmission.

(2) *Dactylosoma splendens* was not observed by Nöller except in the vermicular phase. No " daisy-like " schizogony was observed. He considers the organisms should be placed in the Haemosporidia between the Plasmodia and the Piroplasmata.

(3) *Lankesterella minima*, Chaussat (= *L. ranarum* Lankester) has typical haemogregarine-like schizogony. The schizonts never occur in the peripheral blood, but only in the endothelium of the internal organs. The merozoites and gametocytes of *Lankesterella* are distinguished from the gametocytes of *Dactylosoma* by the possession of two vacuoles near their nucleus and by their nuclear structure. Nöller states that he has found by experiments that the vermicules of the *Lankesterella* enter the gut-epithelium of *Hemiclepsis marginata* and they can be recognised there for about six weeks.

(4) *Cytamoeba bacterifera* has been found in the erythrocytes of frogs, with the bacterial rods arranged at the periphery of the vacuole. Similar rods have been found in the proboscis sheath and stomach diverticula of *Hemiclepsis marginata*, but it is uncertain whether they are identical with those of *Cytamoeba.*

H. B. F.

CHATTON (E.). *Leptomonas* **de deux** *Borborinae* **(Muscides). Evolution de** *L. Legerorum*, **n.sp.**—*Compt. Rend. Soc. Biol.* 1912. Aug. 2. Vol. 73. No. 28. pp. 286-289.

(I.) *Leptomonas legerorum* of *Sphaerocera subsultans.*—The host (*S. subsultans*) is a small coprophagous fly, 11 out of 16 flies being parasitised. The monadine or flagellate parasites are 15μ to 25μ by 6μ to 12μ. They are most numerous in the mid-gut. Postflagellates which are gregarine-like and spermoid (with nucleus and blepharoplast in conjunction posteriorly), occur in the hind gut. Cysts, with separate nucleus and blepharoplast, were also seen.

The imaginal infection is endotrophic, that is, the flagellates occur within the lumen of the gut, along the area lined by the peritrophic membrane, and in contact with the food particles. The larval infection is peritrophic, that is, the parasites occur localised in the space between the intestinal epithelium and the peritrophic membrane, and free from food particles. In the first case (endotrophic) the flagellates may be fixed to the inner surface of the peritrophic membrane; in the second case the parasites may be attached to the intestinal epithelium. There is, then, no continuity between the larval and imaginal infection. The flagellates of the larva, after metamorphosis, are eliminated with the "yellow body." The infection of the imago is a new infection.

(II.) In another Borborine fly, *Limosina thalammeri*, the author found another *Leptomonas* (species unnamed). The infection in the adult fly was endotrophic (a simple culture), the rectum being uninfected. The larval fly was not infected.

The paper is illustrated by 14 text figures.

H. B. F.

CHATTON (E.). *Leptomonas Roubaudi*, **n.sp., Parasite des Tubes de Malpighi de** *Drosophila confusa* **Staeger.**—*Compt. Rend. Soc. Biol.* 1912. Aug. 2. Vol. 73. No. 28. pp. 289-291.

Leptomonas roubaudi is a new flagellate found by the author in the Malpighian tubules of the Muscid, *Drosophila confusa.* This newly found flagellate is distinct from *Leptomonas drosophilae* (in the intestine) and *Trypanosoma drosophilae* (in the Malpighian tubules) which commonly occur in the same fly.

L. roubaudi exists in the larva and the adult. Many of the parasites are attached to the epithelium. Flagellate and post-flagellate encysted forms occur. Large immobile individuals measure up to 30μ in length. Gregarine-like forms divide longitudinally.

The author compares this herpetomonad with members of the genus *Cercoplasma* (Roubaud).

The paper is illustrated by 11 text-figures, [and shows the importance of considering the possibility of multiple infection of flagellates in an insect host, which flagellates might easily be mistaken for various developmental stages of a single parasite.]

H. B. F.

ASHWORTH (J. H.) & RETTIE (T.). **On a Gregarine**—*Steinina rotundata*, **nov. sp.—present in the Mid-gut of Bird-Fleas of the Genus** *Ceratophyllus*.—*Proc. Roy. Soc.* 1912. Dec. 17. Series B. Vol. 86. No. B. 584. pp. 31-38. With 1 plate.

The Gregarine was found chiefly in the alimentary tract of *Ceratophyllus styx* occurring in sand-martin's nests. Also, a few gregarines were observed in *C. farreni* (from nests of the house-martin) and *C. gallinae* (from nests of the blue-tit). The fleas were collected from birds in the Scottish Lowlands. The authors review the previous records of Gregarines in fleas, but their parasite differed therefrom.

The Gregarine belongs to the family *Actinocephalidae*, genus *Steinina.* The species is new, *S. rotundata.* No intracellular stage was found. The adult trophozoite is pyriform and septate and is differentiated into epimerite, protomerite and deutomerite; the epimerite attaches the gregarine to the gut-epithelium during part of its life. In the younger trophozoites the protomerite and deutomerite together usually form an oval or sub-spherical mass. The adults, which may be 180μ long by 70 to 80μ broad, are solitary except when associated in pairs preparatory to the formation of gametes. The cysts are spherical, 110 to 185μ in diameter and contain numerous spores; they occur in the mid-gut of the flea. Each spore contains 8 sporozoites. The spores are ingested by larval fleas, and early trophic phases occur therein.

The paper is well illustrated.

H. B. F.

Marullaz (M.) & Roudsky (D.). **Contribution à l'Etude de *Haemogregarina terzii* Sambon et Seligmann.**—*Compt. Rend. Soc. Biol.* 1913. Jan. 24. Vol. 74. No. 3. pp. 128-131.

H. terzii occurs in the blood of the *Boa constrictor*. In the paper the authors record their observations on the structure of the nucleus of the parasite, as seen in "wet fixed" preparations, using corrosive-alcohol and staining with ammonia-alum-haematoxylin, or with Giemsa. Details of the ammonia-alum-haematoxylin method are given.

The nucleus is elongate and large. Nuclear polymorphism was observed and considered by the authors to "correspond with different stages of evolution of the haemogregarines."

The nucleus of the medium-sized parasites exhibited a coarse spiral thread of chromatin of 4 to 5 turns, or more often it consisted of four, five or six chromatin masses arranged somewhat serially, while some nuclei consisted of granules of chromatin 8 to 25 in number.

Multiplicative forms of the parasite were seen in the liver of the host. Free forms were found in heart blood.

No blepharoplast was observed and the interpretation of Carini that a blepharoplast occurred in *H. tupinambis* is doubted.

The authors do not consider that the parasites exhibit sexual characters.

The paper is clearly illustrated by nine text-figures.

H. B. F.

França (C.). **Les Hémogrégarines des Sauriens. Réponse au Dr. Woodcock.**—*Bull. Soc. Portugaise des Sciences Naturelles.* 1913. Vol. 6. No. 1. pp. 47-54.

The author protests against the statement of Woodcock (see this *Bulletin* No. 5, p. 264) that certain species of Haemogregarines, *H. nobrei*, *H. bicapsulata*, *H. marceaui* and *H. nana*, occurring in the lizard *Lacerta muralis*, are different forms of a single species, *Karyolysus* (*H.*) *lacertae.*

He quotes the researches of Laveran and Pettit on the Haemogregarines of *Lacerta muralis* from France and Portugal in support of his work, and maintains his original views.

H. B. F.

Fantham (H. B.) & Porter (Annie).—Some Effects of the Occurrence of Myxosporidia in the Gall Bladder of Fishes. (Preliminary Communication.)—*Ann Trop. Med. & Parasitol.* 1912. Dec. 30. Vol. 6. No. 4. pp. 467-481.

In this paper the authors record the preliminary results of their examination of over 100 marine fishes—both Teleosts and Elasmobranchs—for Myxosporidia. The examinations were made at Luc-sur-Mer, Normandy, and many of the fish were of kinds commonly used for food.

The Myxosporidian parasites, belonging to various genera, have been regarded previously as well-nigh harmless. It was found, however, that such was not the case, for the colour and consistency of the bile were seen to be altered from bright green to yellowish or brownish, much mucus being present, while there was thickening of the wall of the gall bladder. A catarrhal cholecystitis occurred, as shown by leucocytic infiltrations around the small blood vessels in the fibro-muscular coat of the infected gall-bladder, in some parts of the sub-serous layer and at the bases of some of the papillae of the mucosa. Numerous mucous cells occurred at various points in the epithelium. In some cases, processes from myxosporidian trophozoites could be clearly seen penetrating the epithelium. Some of the fish showed inflammation of the intestine and were emaciated.

[Although these investigations were not made on fish from tropical seas, doubtless such parasites occur in them, perhaps more intensely. The notice of workers in the tropics is briefly drawn to myxosporidiasis in fish.]

H. B. F.

SLEEPING SICKNESS.

TRANSMISSION.

ROBERTSON (Muriel). **Notes on the Life-History of *Trypanosoma gambiense*, with a brief Reference to the Cycles of *Trypanosoma nanum* and *Trypanosoma pecorum* in *Glossina palpalis*.**—*Philosophical Trans. Roy. Soc. London.* 1913. Jan. 31. Series B. Vol. 203. No. B. 298. pp. 161-184. With 5 plates.

An abstract of this paper has already been reviewed at length (see this *Bulletin* No. 5, pp. 267-268). It will not be necessary to recapitulate that review, but rather to add to it.

At the outset the author notes that hereditary infection of *Glossina palpalis* with flagellates may be considered to be " invariably negative."

Many cytological details are given in the paper. Regarding the division of the trypanosomes in vertebrate blood, it is stated that the " flagellum splits, but never throughout the whole length; it becomes free about two-thirds of the way down, and the flagellum of the daughter-individual is usually shorter than that of the parent."

Considering the exogenous cycle in the fly, the author states that the " inability on the part of the parasites to maintain themselves in the proventriculus during a fast becomes of some importance in the cycle when the habits of the wild flies in regard to feeding . . . are remembered. The majority of wild flies are obviously exposed to fasts of considerable duration, and it is this circumstance, combined with the peculiarity of the trypanosomes just mentioned, that seems to necessitate some seat of attachment for the trypanosomes anterior to the proventriculus in all cycles developing in *Glossina palpalis*. In *T. gambiense* the flagellates invade the salivary glands; in *T. pecorum* and *T. nanum* . . . they attach themselves in the proboscis after having gone through a gut-development not unlike that of *T. gambiense*; in *T. vivax* and *T. uniforme* the whole cycle takes place in the proboscis. There is at present, as far as I am aware, no case of a completely investigated gut form carried by *Glossina palpalis* being transmitted directly from the alimentary canal without some definite secondary focus occurring anterior to the proventriculus."

T. pecorum develops in *G. palpalis*, " but the cycle is so extraordinarily slow, and the transmission so difficult to effect, that it appears . . . that this fly is at most only a facultative intermediate host for *T. pecorum*." " The flagellates [therein] are more massive and larger " than in *T. gambiense* and *T. nanum*.

The author's summary is as follows:—

" 1. *T. gambiense* undergoes an endogenous cycle of development in the vertebrate in the circulating blood. This cycle is of irregular duration and is repeated many times in the course of the disease.

" 2. The short forms may be regarded as the adult blood-types; the intermediate types are growth-forms, proceeding to the long individuals, which are those about to divide. The products of division give rise, directly or indirectly, to the adult forms. The adult forms appear to be alone responsible for carrying on the cycle in the transmitting host.

"3. The multiplication occurs in the circulating blood.

"4. Multiplication of the parasites was never found within the cells of the liver, spleen, or lungs in monkeys.

"5. Rounded non-flagellate types were found on one occasion in the lung, liver, and spleen of a virulently infected monkey. They appear for the most part to be destined to destruction, but it is not excluded that they may survive in small numbers as latent forms.

"6. In the fly the trypanosomes are first established in the posterior part of the mid-gut. Multiplication occurs and trypanosomes of very varying sizes are produced.

"7. From the 10th or 12th day onwards slender long trypanosomes are to be found in increasing numbers. These finally move forward to the proventriculus and are the dominant, though not the only, type seen there. The proventriculus becomes infected as a rule between the 12th and 20th days.

"8. The salivary glands become infected by the slender proventricular types. They reach the salivary glands by way of the hypopharynx; arrived in the gland, they become attached to the wall and assume the crithidial condition. Multiplication occurs and finally small trypanosomes are produced, closely resembling the blood type. The passage through the crithidial stage is characteristic of the salivary development and the trypanosome forms just mentioned are derived from the crithidial types. The development in the salivary gland takes from two to five days before the forms are infective.

"9. The fly is never infective until the glands are invaded. Trypanosomes from the proventriculus when injected into a monkey never produce infection. Trypanosomes may be found in the salivary glands as early as the 16th day of the cycle. An early infection of the salivary glands is always preceded by a very virulent and rapid gut infection.

"10. The trypanosomes are never attached to the wall of the alimentary canal, and there is no intracellular multiplication in the gut cycle. A crithidial stage does not occur in the gut cycle. The trypanosomes are never found in the body cavity nor are they ever established in the rectum.

"11. Conjugation has not been observed, nevertheless the fly cycle as a whole has the biological significance of conjugation.

"12. The cycles of *T. nanum* and *T. pecorum* agree with that of *T. gambiense* in showing a gut development without a crithidial phase. The crithidial phase occurs in the proboscis, where the flagellates attach themselves. The salivary glands are never infected in the case of *T. nanum* and *T. pecorum*."

The paper is illustrated by 60 figures of *T. gambiense*, 8 of *T. nanum* and 6 of *T. pecorum*.

[In reference to Miss Robertson's conclusions on the trypanosome cycle in vertebrate blood the reviewer wishes to draw attention to the enormous amount of work done on this subject by various investigators in Liverpool, some three years ago. Further, it is of interest to note that the forms of *T. gambiense* found by J. G. Thomson and Sinton (1912) in cultures (see this *Bulletin*, No. 1, pp. 53-54) resemble in detail those found in the gut of the fly.]

H. B. Fantham.

Roubaud (E.). **Relations Bio-géographiques des Glossines et des Trypanosomes.**—*Bull. Soc. Path. Exot.* 1913. Jan. Vol. 6. No. 1. pp. 28-34.

Transmission experiments show that tsetse flies which are given infective feeds do not all contract salivary infection. If the number of the infective feeds is increased more flies become infected, but there are always some which remain free. An instance is given from an experiment with *T. cazalboui*. The flies are not therefore, the author writes, at all times susceptible of contracting infection; they must be in a condition of receptivity. This receptivity, the author considers, applies only to salivary infection and may be independent of infection of the digestive tube.

Observations of natural infection of tsetse flies has shown for different districts that flies of different species frequenting the same district are not infected in the same proportions nor in the same manner. Thus in Lower Dahomey *T. cazalboui* was found to predominate in *G. longipalpis* and *palpalis*, *T. dimorphon* in *longipalpis* and *tachinoides*, *T. pecaudi* in *longipalpis*. In Upper Dahomey, on the other hand, *T. pecaudi* predominated in *morsitans*, and in Casamance *T. dimorphon* in *morsitans*. The author thinks these differences are the result of modifications of receptivity of the flies according to the bio-geographical influences to which they are submitted. As regards *T. cazalboui* in *G. palpalis* he notes that the proportion of flies experimentally infected in the regions investigated by him were in Middle Dahomey 40 per cent. and in Upper Casamance nil, though repeated attempts were made to infect the flies. These differences were confirmed by the examination of natural infections. In Middle Dahomey one fly in thirty was naturally infected with *T. cazalboui* and in Upper Casamance of 560 flies examined there was only one case of proboscis infection. Souma existed in each region, but in one case must have been transmitted by another species of tsetse. Again, he contrasts the case with which KLEINE and BRUCE transmitted *T. gambiense* by *G. palpalis* and the non-success of BOUET and himself in Dahomey and Casamance. In these latter regions human trypanosomiasis does not exist or is rare. Thirdly, the results of KINGHORN and YORKE are mentioned in the valley of the Loangwa and on the plateau respectively (*G. morsitans* and *T. rhodesiense*). Fourthly, the non-success of KLEINE and FISCHER with *G. morsitans* and *T. gambiense* on the Victoria Lake, and the success of TAUTE on Tanganyika with the same species. From these data the author deduces that the receptivity of a given species of Glossina for a given virus is not uniform throughout the extent of the species' distribution. Receptive and refractory or indifferent races thus occur in nature.

In his opinion it is not correct to say that climatic factors exercise an influence on the evolution of trypanosomes in tsetse flies. This influence is only an indirect one, and this is shown by the fact that in a region where several species of tsetse exist certain species are favourable to a virus while others are not. Though the climatic factors are the same, the different species of Glossina react differently; their receptivity is not the same.

It appears then that a virus will be endemic only in areas where there exist receptive races. Owing to the natural migrations of flies there are constant exchanges between the areas of receptivity and indifferent areas. This seems to explain the existence of sporadic cases of trypanosomiasis in certain regions where, in spite of the great number of flies, trypanosomiasis is not common.

In such areas not only are there few cases, but there is a tendency to mildness of type of the disease. It is possible that geographical influences acting on an infected tsetse coming from an area of normal endemicity are able to attenuate the parasites in the salivary fluid and even at length to disinfect the fly. It follows that the presence of numerous tsetse flies in a region must not always be considered *a priori* as a danger to man or domestic animals. The introduction of a virus into a tsetse area where it does not already exist must not necessarily be considered as dangerous. It also follows that to get the best results from deforestation this measure ought to be preceded by experimental examination of the receptive properties of the flies, or at least by an estimation of their natural infecting power.

A. G. B.

FISCHER (W.). **Experimentelle Untersuchungen über die Rolle der *Glossina morsitans* als Ueberträgerin der Schlafkrankheit am Viktoriasee.** [Experiments on the Rôle of *Glossina morsitans* as Carrier of Sleeping Sickness on the Victoria Lake.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1913. Feb. Vol. 17. No. 3. pp. 73-85.

This paper contains details of transmission experiments on the Victoria Lake, an account of which has been given in this *Bulletin* (No. 5, p. 270). The experiments showed that occasionally at the level of the Victoria Lake *Trypanosoma gambiense* can undergo its complete development in *Glossina morsitans.* It was concluded that other species of tsetse fly, such as *G. fusca* or *G. tachinoides,* may occasionally act as hosts for *T. gambiense* and it is recalled that R. KOCH saw a commencement of development of *T. gambiense* in *G. fusca.*

Some notes are added on the biology of *Glossina morsitans.* Of the flies used in the transmission experiments 636 were males and 766 females. On the 71st day there were still alive 135 males or 25 per cent. and 265 females or 39 per cent. Here again it is seen that the females were more tenacious of life than the males. The bred *G. morsitans* began to drop larvae about the twentieth day. The pupal stage lasted on an average 35 to 40 days. Pupation in the body of the mother was found eleven times; the pupae were in every case dead.

Additional evidence is given that trypanosomes are not conveyed hereditarily in tsetse flies. It is noted that the monkeys employed in the experiments never showed trypanosomes of any kind.

A. G. B.

Dr. Philip H. Ross, Bacteriologist, East Africa Protectorate, reports that he has succeeded in infecting a monkey with trypanosomes by the bite of *G. longipennis.* Freshly caught flies were kept after arrival at Nairobi in an incubator at 25° C. The monkey was bitten 577 times between December 5th, 1912, and January 11th, 1913. Trypanosomes were found on January 13th. The author would, for the present, class them in the *T. dimorphon* group

A. G. B.

CLINICAL.

MARTIN (Louis) & DARRÉ (Henri). Un Cas de Trypanosomiase Humaine contractée au Laboratoire.—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 883-891.

The authors point out that this case is interesting from three points of view: the infection was contracted in the laboratory in the study of animal trypanosomiases; the patient had acute nephritis which disappeared with atoxyl treatment; and the constant reappearance of relapses in spite of regular treatment led them to increase the frequency of the doses instead of augmenting them.

The patient was an Italian professor, aged 34, who entered the hospital at the Pasteur Institute in May 1912. For eighteen or twenty months he had been getting thin and had often complained of headache. In August and September 1911 he had several febrile attacks lasting two or three days, which were put down to pappataci fever. In March 1912 he noticed that his urine was red, but he did not examine it. In April he had high fever lasting several days, attributed first to toxic infection from the intestine, then to typhoid fever, and then to paratyphoid. This fever lasted eight days and reappeared after four days' apyrexia, the second attack lasting seven days. During a third attack the blood was examined and trypanosomes were found. Atoxyl was injected on April 26th and 30th. On May 2nd there was general oedema, more especially of the face and extremities; the urine contained albumin. On May 6th 0·85 gm. atoxyl was injected and on May 13th and 16th smaller doses. The patient then went to Paris.

On admission to hospital he was found to have the usual symptoms of African trypanosomiasis: emaciation, anaemia, asthenia, enlargement of the cervical, axillary, and inguinal glands; enlargement of the spleen, and to a less extent of the liver; raised temperature with acceleration of pulse; and patches of roseola on the trunk; there were no nerve symptoms. In addition the urine was scanty and deep coloured, and contained albumin, blood, granular casts, and numerous rënal cells; there were no other symptoms of nephritis. The blood contained very numerous trypanosomes; there were none in the urine. On the succeeding days the patient was treated with atoxyl and tartar emetic. Three days after admission the albuminuria had disappeared. Between May 22nd and June 14th he had seventeen injections of 0·1 gm. tartar emetic and four injections of atoxyl, 0·5 gm. During this time his condition was very good and there were no trypanosomes. On June 14th the temperature went up a little and on the 15th there was albuminuria. Atoxyl was given and the albuminuria disappeared; this occurred a third time. On July 13th the patient left the hospital and was advised to continue the atoxyl injections every five days. He however relapsed again. From October onwards he had the injections every four days; there has been no further relapse.

The authors say that the infection was undoubtedly contracted in the laboratory; the patient had never lived in Africa. The precise moment of infection is unknown; it is probable that it was due to small excoriations of the skin, considered of no importance. The precise nature of the virus is also unknown. His researches were chiefly made with nagana. They think that from the symptoms and course of the disease the infection is comparable with that of *T. gambiense*. The acute nephritis was undoubtedly caused by the trypanosomes because it disappeared only when atoxyl was given and this on three occasions. The authors have only once before observed nephritis in a sleeping sickness patient, and he had reached the last stage. They compare this form of nephritis with that caused by syphilis, which is only cured by antisyphilitic treatment. They note that numerous relapses occurred in spite of regular treatment. However they do not think that the trypanosomes were atoxyl-fast, because they were controlled when more frequent doses were given. Atoxyl fastness in their opinion is rare in human pathology. They remark that the atoxyl was sterilised by heating to 110° in the autoclave; this is in their opinion the best way of preparing it; it must then be kept in the dark or it will decompose. With regard to the increased frequency of the doses they considered that this would prevent the parasites from multiplying. They suggest that there may be several types of trypanosomes with cycles of multiplication in the blood of different duration, which would be analogous with malaria.

Mesnil said that he had procured the virus with which Professor L. was working and had also obtained two mice and a guinea-pig inoculated with his blood. The laboratory virus, he stated, was nearer to *T. evansi* than to *T. brucei* or *T. togolense*. With regard to the trypanosome from the patient, its biological properties are different and its affinities appear to be with *T. gambiense*. Mice injected had usually a chronic disease. The trypanosome was refractory to human serum. He intended to make experiments of active crossed immunity before coming to any conclusion.

A. G. B.

Ranken (H. S.). **Report on the Work of the Commission in the Yei River District, Lado Enclave, for the Year ending 30th September, 1912.** [MS., forwarded by the President, Sudan Sleeping Sickness Commission.]

The last report on this District was summarised in *Sleeping Sickness Bulletin*, Vol. 3, p. 473. A map was there published showing the sleeping sickness areas in the Lado Enclave. Ranken says that these areas have extended eastwards. In some villages fresh cases are found at every inspection; these villages are very badly situated, the whole of the surrounding district being beset with fly-infested khors. It is remarked that much cannot be expected of village moving, there being no large isolated fly-free region. The original clearings made at Yei have been kept up; the work now consists in cutting down the grass and a few shrubs, the trees having been all destroyed on the first occasion. Cultivation on the cleared areas has been found to be impracticable. The following figures are given for the sleeping sickness camp:

Total number admitted up to September 30th, 1911	269
Total number admitted from September 1911 to September 1912	139
Total	408
Deaths up to 30th September 1912	88
Permanent desertions	6
Number of cases in camp September 30th, 1912 ...	314

39·2 per cent. of the above number have survived eighteen months and 70 per cent. for one year. The majority of the cases are young adults and middle aged, but the disease has been seen at all ages from the very old to the age of two.

There are now 35 infected villages in the district which are inspected systematically. A table is given showing the number of cases admitted from each village with the percentage of population infected. Everyone coming into Yei is sent for gland palpation; several cases have thus been detected. The total number of palpations at village inspections is 20,000, and at Yei itself 14,000; 695 persons have been examined by the gland or blood film method and 139 found to be infected.

As to the methods of diagnosis the author does not think that the system of examination and palpation by native inspectors can be satisfactory. The routine at Yei is that all cases with symptoms or suspicious glands are examined by gland puncture. If the first puncture is negative, a second is done. If this also is negative, an examination is made of fresh blood. At least fifteen minutes is allowed for each slide. He thinks that owing to the facility and rapidity of diagnosis by gland puncture fresh blood examination is falling into desuetude. In some cases he has found a trypanosome after a short search in the first drop of blood examined, when the parasites were only found in the second gland punctured. In two instances, which are given, several gland punctures failed to show trypanosomes, but they were found easily in the blood.

The drugs used have been metallic antimony (PLIMMER), atoxyl, salvarsan, and arsenophenylglycin with tryparosan. The treatment of seven cases by salvarsan was described in *Sleeping Sickness Bulletin*, Vol. 3, p. 474. Three of these patients are alive and well, having been without treatment for over a year; three are dead, and the remaining case has relapsed. A further series of ten cases is being treated by the same method.

A table of symptoms observed on admission to camp of the last hundred cases is as follows:—General tremor 7, tongue tremor 37, tremor of hands 9, oedema of eyes 18, skin eruption 1, ataxy 3, slurring speech 1, mental cloudiness 5, 'sleeping' 5, mental symptoms 6, asthenia with marked malnutrition 22. Adenitis was present in all cases. Auto-agglutination has been by no means invariable; much time would seem to have been lost searching for trypanosomes in some such cases. The author suggests that the presence of *Filaria perstans* has some influence in regard to this phenomenon, and refers to a case mentioned by MAY (see *Sleeping Sickness Bulletin*, Vol. 4, p. 199). An extremely fine fibrillary tremor of the tongue was the most common symptom next to adenitis; it is to be distinguished from the coarse tremor which is a late symptom. Somnolence is considered to be a relatively early symptom of cerebral involvement. Two cases admitted seventeen months before and noted then as drowsy were very well at the time of writing. Two other patients have been free from drowsiness for six months. In three cases in children the author has been much impressed by their forwardness or lack of shyness, a feature absent in the other healthy children. This precocity, he says, was very striking. There have been two cases of blindness, one in a very old, the other in an advanced case; the author attributes the condition to the disease in each instance.

He gives the history of a case which was under observation before the diagnosis. The patient was a boy employed by one of the Sudan Sleeping Sickness Commission officials for eighteen months, during which he was frequently examined. Two months before his case was diagnosed he became ill with diarrhoea and gastric disturbance, and a few days after was found to have dilatation of the heart, oedema of the feet and legs, and albuminuria. Later it was noticed that there was some enlargement of the glands of the neck, and trypanosomes were found on puncture.

Laboratory work has been directed to the investigation of patients after treatment and observations on the infective granule in trypanosomiasis. A few animals were shot near Yei and examined for trypanosomes. Parasites of the *brucei* type were found in a waterbuck.

A. G. B.

TREATMENT.

RIQUIER (J. C.). **Das "606" bei der experimentellen Infektion durch** *Trypanosoma Brucei* **und durch** *Trypanosoma equiperdum.* ["606" in Experimental Infection by *T. brucei* and *equiperdum.*]—*Zeitschr. f. Immunitäts-forschung u. Exper. Therapie.* 1912. Dec. Vol. 16. No. 1. pp. 92-101.

The author's experiments were made with strains of nagana and dourine, the experimental animals being rabbits. The drug was injected intramuscularly as soon as the trypanosomes were present in considerable number in the circulating blood and the animals had characteristic symptoms of the disease. In every case a prompt improvement was noticed. Examination of fresh and stained films showed that the trypanolytic action of the drug was very rapid, the parasites disappearing in from one to three hours. An account is given of the animals which were infected and treated. In every instance the trypanosomes disappeared as the result of the injection and the blood taken a few days later was non-infective to rats; later trypanosomes reappeared and death followed. The non-infective period lasted from one to six days and possibly longer.

Seeing that the blood became sterile after the injection the author supposed that the trypanosomes might be present in the internal organs; he therefore made a second series of experiments. In these the animal was killed a few days after the administration of the drug. Portions of its organs were then inoculated into white rats—heart-blood, spleen, liver, lymphatic glands, bone marrow, nervous system. It was thus shown that only the bone marrow and less frequently the lymphatic glands and spleen were able to produce infection. Typical trypanosomes were never found in these, but within connective tissue cells and endothelial cells there were seen rounded forms which do not occur in rabbits uninfected with trypanosomes. The author has previously described such forms in the organs of rabbits suffering from dourine. Putting these observations together, namely, the sterility of the blood after an injection of '606,' the infectivity of the bone marrow, spleen, and lymph gland emulsions, and the presence of these endocellular forms, he suggests it is justifiable to assume a connection between these forms and the relapses. He has, however, never seen transition forms between these bodies and trypanosomes, and thinks that more investigation is needed.

[PLIMMER and BATEMAN after treatment of nagana-infected rats with antimony found that the bone marrow was infective when the blood was incapable of conveying infection. In the case of rabbits infected with *T. gambiense* and *T. equiperdum* trypanosomes have been found in numbers in this situation (BENTMANN and GUNTHER; BECK; ZWICK and FISCHER). BUCHANAN found 'developmental forms' of *T. brucei* (*pecaudi*) in the spleen, bone-marrow, and axillary glands of infected gerbils.]

A. G. B.

SALMON (Paul). **L'Acridine dans le Traitement de la Maladie du Sommeil Expérimentale.**—*Compt. Rend. Soc. Biol.* 1913. Jan. 24. Vol. 74. No. 3. pp. 134-136.

Certain dyes of the acridine or oxazine series attack trypanosomes in a special way: there is vital staining of the blepharoplast, it disappears, and finally the parasite is destroyed. The author, investigating these dyes, found that they have a favourable therapeutic action in trypanosome infections, especially of *T. gambiense.* The virus employed killed mice regularly in six days. The dye which gave the best results was trypoflavin A (acridine) given subcutaneously. In two instances it was found to have a preventive action when given together with the virus. Six mice were treated on the fourth day of infection; all but one recovered. The relation between the maximum and the minimum therapeutic doses was more than $\frac{1}{5}$, showing that there is a good margin between the curative and the toxic doses. The trypanosomes were found in the blood several hours after the injection.

A. G. B.

BRIEGER (L.). **The Chemical Therapeutics in Trypanosomes Infection after Delivery through the Mouth.***—*Jl. State Medicine.* 1913. Feb. Vol. 21. No. 2. pp. 115-117.

The substance of this paper was reproduced in *Sleeping Sickness Bulletin,* Vol. 4, p. 328. The present paper contains nothing new.

A. G. B.

IMMUNIZATION.

NOVY (F. G.), PERKINS (W. A.), & CHAMBERS (R.). **Immunization by Means of Cultures of** ***Trypanosoma lewisi.***—*Jl. Infectious Diseases.* 1912. Nov. Vol. 11. No. 3. pp. 411-426.

In a previous paper Professor Novy showed that cultures of *Trypanosoma lewisi* when plasmolyzed were capable of producing immunity in rats. At the same time it was pointed out that cultures of *T. lewisi* and *T. brucei,* even after having passed through 100 generations in the course of two years, did not become attenuated but readily infected. The culture of *T. lewisi* used for the present experiments was isolated from a rat in September 1905 and has been maintained on ordinary blood agar media at

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* This title seems to be a translation of the German—"*Chemotherapie bei Trypanosomeninfektion nach Verabreichung per os.*"

25°. It is now in the 313th generation. It was at first readily infective and this property persisted till March 1909, the culture being then in the 158th generation. It was then found to be non-infective; it had become fully attenuated. All attempts to restore the infective character of this culture have been fruitless. The majority of inoculated rats, however, showed in their blood within the next day or two a small number of typical blood trypanosomes. These usually disappeared within 48 hours. Blood containing these trypanosomes was injected into clean rats and planted at the same time on blood agar, but it failed to infect the rats or to give cultures. These trypanosomes are in fact incapable of further multiplication or reproduction; they are sterile or abortive forms.

By means of this attenuated culture the authors were able to obtain a solid and permanent immunity in rats. Young rats were employed and a very small but surely infective dose of the virulent organism, owing to the fact that a very large dose of virus may readily break down a slight immunity. In the first series of experiments a single injection was made of two or six cultures. When the interval between the injection of the vaccine and the test dose was two or three days there was a rich infection, showing that little or no immunity existed. There were some mild infections with an interval of ten and even seventeen days, but these did not persist long. It was evident that immunity was produced by the injection of living cultures of *T. lewisi* and that this immunity was most pronounced after the lapse of about ten days. There was a notable difference in immunity production according to whether the vaccine was introduced intraperitoneally or subcutaneously. When given subcutaneously a much larger dose was required to obtain protection. These results are shown in tables. This active immunity once developed probably persists until the death of the animal; up to the present it has not been tested for a longer period than five months.

Duration of Immunity following the Single Injection of Living Cultures.

Rat No.	Received.	Interval before Test Dose.	Test Dose of *Tr. lewisi* Blood.	Result.
1	2 cultures ...	35 days ...	0,0001 cc. ...	0
2	" " ...	" " ...	" " ...	0
3	6 " ...	42 " ...	" " ...	0
4	" " ...	" " ...	" " ...	0
5	6 " ...	74 " ...	" " ...	0
6	" " ...	" " ...	" " ...	0
7	2 " ...	78 " ...	" " ...	0
8	" " ...	" " ...	" " ...	*
9	" " ...	84 " ...	" " ...	0
10	" " ...	" " ...	" " ...	0
11	" " ...	112 " ...	" " ...	0
12	6 " ...	119 " ...	" " ...	0
13	2 " ...	150 " ...	" " ...	0
14	6 " ...	159 " ...	" " ...	0

* A single trypanosome was found on each of two days.

The marked protection following the injection of living cultures suggested the possibility that vaccinated rats would be equally protected against natural infection by the flea or louse. The number of parasites present in the test dose of blood must be considerably larger than could be introduced through the agency of a biting insect. The white rat used in the laboratory has not been found to harbour fleas, but is often heavily infected with lice. After two unsuccessful experiments

"ten rats were first injected each with two cultures and after ten days, five of these were tested and found to be immune. The remainder, together with five clean and eight lousy, infected rats, were confined in a small cage. Later five additional infected and lousy rats were added. Of the vaccinated rats four died on the 24th, 29th, 52nd, and 130th day, respectively, without at any time showing trypanosomes in their blood. Of the five clean controls, two died on the 61st and 106th day without becoming infected. The remaining three became infected on the 28th, 69th and 81st day. The fact that three out of five non-immunes and none of the vaccinated animals became infected would indicate that the living vaccine does protect against infection by the louse. Further tests, however, especially with directly transferred lice, will be necessary fully to establish this point."

Some experiments on the curative action of cultures were indicative of a marked inhibitory influence and pointed to the possibility of aborting an infection by repeated large doses of the vaccine.

The authors' summary is as follows—

"*Tr. lewisi* after cultivation for several years on rabbit blood agar medium becomes non-infective.

"Trypanosomes may appear in very small numbers in the blood of rats inoculated with such cultures but they are incapable of multiplication *in vitro* or *in vivo*.

"Rats which receive one or more injections of the living culture acquire a solid immunity which becomes apparent in about 10 days.

"The immunity produced by the living culture is lasting and probably persists through life.

"The immunity induced by the living vaccine is probably efficacious against the natural transmission through the flea and louse.

"The immunity is not due to soluble products, since plasmolyzed and filtered cultures are inert.

"This successful immunization against *Tr. lewisi* by means of a living vaccine renders it probable that like results may be obtained with the more strictly pathogenic trypanosomes. It may be added that encouraging results have already been obtained with *Tr. brucei.*"

[This valuable paper should be consulted in the original.]

A. G. B.

Laveran (A.). **Essais d'Immunisation contre des Trypanosomes pathogènes.**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 877-882.

Laveran points out that attempts to immunise against the pathogenic trypanosomes by means of dead trypanosomes have hitherto given unsatisfactory results. Lately, Schilling on the one hand and Braun and Teichmann on the other have announced that they have succeeded in immunising various animals against several species of trypanosomes by modifying the technique employed by their predecessors. Laveran decided to repeat the experiments. In this paper he describes his attempts to immunise by Schilling's method and by sensitised trypanosomes.

Schilling used for his experiments *T. brucei* killed by tartar emetic. His technique is detailed. Laveran followed it closely, using *T. brucei* and *T. rhodesiense*. In attempts to immunise mice with *T. brucei* (Ferox of Ehrlich) he had very little success. The *T. rhodesiense* results were more satisfactory. He draws however the following conclusions:—(1) It is very difficult to immunise mice against *T. brucei* (ferox strain) by Schilling's method; of twelve mice which had each received five injections of trypanosomes killed by tartar emetic none became immune. (2) Immunity is obtained more easily with *T. rhodesiense*, but it is very transitory, like that observed in treated animals, and not like the durable immunity enjoyed by animals which have recovered spontaneously.

The results of the experiments with sensitised trypanosomes, *T. brucei* and *T. evansi*, were such as to show that there is little hope of success in the application of this method to the trypanosome infections.

A. G. B.

TRYPANOSOMA RHODESIENSE.

Taute (M.). **Zur Morphologie der Erreger der Schlafkrankheit am Rovumafluss (Deutsch-Ostafrika).** [The Morphology of the Human Trypanosome from the Rovuma River District, German East Africa.]—*Zeitsch. f. Hyg. u. Infektionskrankh.* 1913. Feb. Vol. 73. No. 3. pp. 556-560. With 1 plate.

The author reports on the morphology of the trypanosome found by him in cases of sleeping sickness in the Rovuma province of German East Africa, on the boundaries of the Portuguese colony of Mozambique. He discusses the possibility of the epidemic being due to *Trypanosoma gambiense* from the north or north-west and considers it unlikely, having regard to the geographical situation and communications of Rovuma. *Glossina morsitans* is the tsetse of Rovuma. The clinical consideration of the cases, marked by little sleepiness in the ordinary sense of the word, high virulence and extraordinary resistance to atoxyl, suggested the probability of the parasite involved being *Trypanosoma rhodesiense*, Stephens and Fantham. Taute then investigated the trypanosomes of Rovuma from the morphological point of view, comparing them with the trypanosomes from the Tanganyika region, using subinoculations in long-tailed monkeys. He finds that the occurrence of posterior nuclear forms, as described by the discoverers, is very characteristic and states that, as this feature gives a definite differential diagnosis, it is immaterial whether *T. rhodesiense* be considered as a new species or as a very distinct variety of *T. gambiense*.

He contrasts the trypanosomes of Rovuma with those of Tanganyika—certified as *T. gambiense*—and his plate is arranged to bring out the contrasts. The Rovuma trypanosomes show the short stout forms, which, as the author says, are those described by Stephens and Fantham. Taute has seen similar forms in the blood of animals in Bruce's laboratory in British Nyasaland. He has never seen posterior nuclear forms in animals infected with

T. gambiense. The somewhat vacuolated appearance and rich granulation seen in some *T. rhodesiense* was also present in the Rovuma trypanosome. The slender and intermediate forms of *T. gambiense* and *T. rhodesiense* are almost identical. Amoeboid forms were found in the peripheral blood. Forms without flagella showed appearances of involution. The author concludes with the statement that the characters of the sleeping sickness parasite of Rovuma, as seen in the blood of apes, are those of *Trypanosoma rhodesiense.*

In a footnote the author notes the possibility of big game trypanosomes also possessing posterior nuclei. [As his paper is subscribed "Lubimbinu bei Amaramba, Portug. Ostafrika, 23 Aug. 1912," it is likely that Taute was unaware of the work of KINGHORN and YORKE, who showed that such game were reservoirs of *T. rhodesiense.*]

H. B. F.

WERNER (H.). **Ueber menschliche Trypanosomiasis mit Schlafkrankheitssymptomen aus Portugiesisch-Ostafrika, verursacht durch** *Trypanosoma rhodesiense,* **und über Lumbalpunktatsbefunde, insbesondere die Nonne-Apeltsche Phase I Reaktion, bei Schlafkrankheit.** [A Case of Human Trypanosomiasis with Sleeping Sickness Symptoms from Portuguese East Africa, caused by *Trypanosoma rhodesiense,* with an Account of Lumbar Puncture findings in Sleeping Sickness.]—*Deut. Med. Wochenschr.* 1913. Feb. 6. Vol. 39. No. 6. pp. 261-263.

This case was first diagnosed by Dr. STANNUS in Nyasaland (see *Sleeping Sickness Bulletin,* Vol. 4, p. 266). The patient, an elephant hunter in Portuguese East Africa, came to England and was admitted into the Albert Dock Hospital, where he remained for a month (see *Journal of the London School of Tropical Medicine,* 1912, Dec., p. 92, and this *Bulletin* No. 5, p. 275). He was admitted into the Seamen's Hospital at Hamburg on September 21st 1912. It is noted that on admission his spleen was very large and that the axillary, inguinal, and crural glands were much swollen. There was marked hyperaesthesia, especially of the deep muscles, and tremor of the fingers and tongue. There was marked sleepiness; the patient went to sleep while he eat and while he talked to the physician. His speech was difficult to understand and his writing was ataxic. The urine contained pus. The trypanosome was studied by von PROWAZEK, who agreed that it was *T. rhodesiense.* The red cell count was 2,250,000; the leucocyte count 2,050. A differential count is given.

The patient was treated with atoxyl and tartar emetic injections. He rapidly became worse. Eight days before his death his eyesight began to fail, and in a short time he became almost completely blind. The sleepiness increased, and in the last few days sleep was unbroken. At this time also the glands became much swollen; in the left inguinal region they formed a tumour the size of a hen's egg. Lumbar puncture done two days before death gave a clear fluid, in which living trypanosomes could be demonstrated without centrifugation. Eighteen hours before death the trypanosomes, which had resisted large doses of atoxyl and tartar emetic, disappeared spontaneously from the blood and did not reappear. Death occurred on October 6th. An account is given of the post mortem findings. Microscopic examination of the brain had not been made.

The author considers the interesting points of this case to be, the clinical picture, the behaviour of the trypanosomes to atoxyl and tartar emetic, the disappearance of the trypanosomes shortly before death, the lumbar puncture findings, and the blood findings. He draws special attention to the marked somnolence and to the increase of the gland swellings shortly before death. He states that the resistance of the trypanosomes to atoxyl and tartar emetic was absolute; these drugs did not produce even temporary reduction of the parasites. He would attribute the disappearance of the trypanosomes eighteen hours before death to saturation of the tissues with carbonic acid. He notes that there was no increase of eosinophiles, as has been noted by SCHILLING and NEWHAM in other cases. He thinks it probable that the sleeping sickness focus in Portuguese East Africa is connected with the one on the Rovuma river on the German border, several hundred kilometres away.

Lumbar Puncture Findings.—NONNE's Phase I reaction proved positive. This reaction, which the author believes has not yet been tested in human trypanosomiasis, consists in the globulin of the puncture fluid being precipitated by a saturated solution of ammonium sulphate. The reaction is obtained when there are morbid changes in the central nervous system. Werner has tried this reaction in two other cases of human trypanosomiasis, in one case with positive, in the other with negative results. He notes that in the two positive cases there were clinical signs of changes in the nervous system. The lumbar puncture fluid of the present case was examined for bacteria; all the media to which it was added remained sterile.

A. G. B.

BEVAN (Ll. E. W.) & MILLINGTON (T. G.). **Notes on a Strain of Human Trypanosomiasis and a Review of the Present Knowledge of the Human Trypanosomiasis of Northern Rhodesia and Nyasaland.**—*Jl. of Comp. Path. & Therap.* 1912. Dec. Vol. 25. No. 4. pp. 298-312. With 6 text-figures.

When it was announced by KINGHORN and YORKE that they had found *Trypanosoma rhodesiense* in 16 per cent. of buck in Northern Rhodesia it was thought that the Veterinary Department should take up again the study of this parasite as it might prove a danger to domestic live stock. A rabbit was therefore obtained which had been inoculated with the blood of a man who died at Livingstone of trypanosomiasis. This was ELLACOMBE's case, described in the *Sleeping Sickness Bulletin* (Vol. 4, p. 185), in which KINGHORN found posterior nuclear forms of trypanosomes. With this strain many animals were inoculated with results which are tabulated. For comparison BEVAN's table of animals inoculated with the Armstrong strain is added (see *Sleeping Sickness Bulletin,* Vol. 3, p. 21) and KINGHORN and YORKE's table. The Armstrong strain, as shown by Bevan, caused a remarkable oedema of the face in rabbits and sheep, illustrated by photographs in the present paper. This new virus did not cause this swelling. A search was made for the feature which STEPHENS and FANTHAM have stated to be the essential characteristic of *Trypanosoma rhodesiense*, namely, the occurrence among the short and stumpy forms of some having the nucleus on the posterior side of the blepharoplast. A table is given showing the results of daily counts of the blood of an infected rabbit and rat. No forms were found with the nucleus in the posterior quarter. [It is not possible to make out from the table how many trypanosomes were scrutinised.] Measurements of 500 trypanosomes were tabulated in the form of a chart; the authors were forced to the conclusion that the variations from day to day and in different species of host are so great that the results obtained are unreliable.

The points on which STEPHENS and FANTHAM laid stress in the separation of this organism are discussed. It is pointed out that if sixteen per cent. of buck may act as reservoirs of the virus it is surprising (a) that the majority of cases have been in males, seeing that women work in the fields and are more exposed to the bite of *G. morsitans*; (b) that the incidence of the disease appears to be associated with the main trunk roads; and (c) that there has not been a greater number of cases. Again it is surprising that among the many thousands of cattle which during the last few years have passed from Fort Jameson to Feira on the way to Southern Rhodesia none have become infected. These animals are all examined by officers of the Veterinary Department, but during the last seven and a half years no trypanosome having the characters of *T. rhodesiense* has been met with, nor have any of the attendants or herdsmen contracted the disease. With regard to the virulence it is not considered that the figures obtained by inoculation have much value for differential diagnosis, as after a series of passages of any strain through different hosts the periods may vary. Some experiments are given in which the serum from an infected sheep was injected into animals in the course of an infection with this virus; it seemed to delay the course of the disease.

A. G. B.

TRYPANOSOMES OF GAME AND DOMESTIC STOCK.

KINGHORN (Allan) & YORKE (Warrington). **Further Observations on the Trypanosomes of Game and Domestic Stock in North Eastern Rhodesia.**—*Ann. Trop. Med. & Parasit.* 1912. Dec. 30. Vol. 6. No. 4. pp. 483-493.

Reference is made to the former Report in which the trypanosomes found in game and domestic animals in the vicinity of Nawalia in the Luangwa Valley were described (see *Sleeping Sickness Bulletin*, Vol. 4, p. 321). Subsequent to this the headquarters of the Commission were removed to the Congo-Zambesi watershed. In this Report the complete results of the examination of big game, domestic stock, and small vermin in Rhodesia are described.

In the valley 127 head of game, comprising 19 genera, were examined and trypanosomes were found in 33. On the plateau 124 head, belonging to 16 genera, were examined and trypanosomes were found in 21. Details are shown in tables. In the valley the parasites were found by direct examination in 26 cases, a percentage of 20·4; on the watershed in 16 cases, a percentage of 13. It is noted that these are high figures for single observations. An analysis of the figures shows that in the valley at least 37·5 per cent., and on the plateau at least 23 per cent. of the local fauna examined were infected with the trypanosomes of man or domestic stock. The percentage infected with *T. rhodesiense* was in the valley 16, on the plateau 3·3. Had sheep and goats been available for inoculation many more buck would probably have been shown to harbour *T. vivax* and *T. nanum*, monkeys and rats being refractory to these species.

Tables show that different species of buck vary widely in their susceptibility. Trypanosomes were never found in zebra (22), buffalo (6), wildebeest (2), or bushpig (4); and only rarely in roan, hartebeest, puku, mpala, and warthog. The species most heavily infected were waterbuck, eland, bushbuck and kudu. These points again are brought out in tables. It is noted that kudu and bushbuck, and waterbuck to a less extent, are usually found in thick cover; the other antelope more often in open country. It is considered however that specific differences in the immunity enjoyed by the buck are probably of greater importance.

Tables show the species of trypanosome occurring in each animal. Double infections were not uncommon. All the animals shot appeared to be in perfect condition. In the valley two cows, four goats, and five dogs were examined for trypanosomes; on the plateau three goats. The species found in both antelope and in domestic animals were *T. pecorum*, *T. nanum*, *T. multiforme*, sp. nov., *T. rhodesiense*, *T. vivax*, *T. ingens?*, T. sp. (*montgomeryi?*). *T. rhodesiense* was found in one dog. Cattle and goats seem to have been scarce. To the suggestion that the small vermin might act as reservoirs of trypanosomes it is objected that many are nocturnal and are not subjected to the bites of *G. morsitans*. The authors examined 142 wild rats, 15 wild mice, wild rabbit, giant rat, squirrel, galago, one of each, and two genets, with negative results. Not a single case of infection with trypanosomes was found in 256 monkeys (*Cercopithecus pygerythus*) examined, though infections with filaria and *Plasmodium kochi* were common.

A. G. B.

Rodhain (J.), Pons (C.), Vandenbranden (J.), & Bequaert (J.). **Note sur les Trypanoses Animales du Haut-Katanga.**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 819-822.

During a stay at Elisabethville, Belgian Congo, one of the authors examined numerous domestic animals in the district of Katanga, some of them introduced from Rhodesia. *Glossina* *morsitans* occurs in the country. The results of examination are shown in the following table.

Species of Animals examined.	Number of Animals examined.	Number of animals found infected with trypanosomes.			Percentage of animals infected with		
		brucei or *pecaudi.*	*congolense* or *pecorum.*	*cazalboui* (*vivax*).	*brucei.*	*congolense.*	*cazalboui.*
Mules ...	67	27	—	—	40·3	—	—
Asses ...	27	7	—	—	25·9	—	—
Oxen ...	10	—	2	7	—	20	70
Pigs ...	11	—	7	—	—	53·6	—
Goats ...	59	—	1	2	—	1·69	3·38
Sheep ...	110	—	—	2	—	—	1·81
Dogs ...	7	5	2	—	71·4	28·8	—

The table indicates the resistance of the Bovidae and smaller animals to trypanosomes of the *brucei-pecaudi* type and their susceptibility to *congolense* and *cazalboui* types. Dogs and mules suffer especially from a virulent infection of *T. brucei.* In these animals posterior nuclear forms may be seen. No case of trypanosomiasis was found among Europeans at Elisabethville.

In conclusion the authors point out that on the high ground in the south of the Katanga, where *Glossina morsitans* alone exists, this fly transmits the same three types of pathogenic trypanosomes as those found in the lower regions in the north of the province.

H. B. F.

EPIDEMIOLOGICAL.

LEGER (André). **Un Petit Centre d'Endémicité de Maladie du Sommeil à Koulikoro, près Bamako, coïncidant avec des Gîtes Permanents à** *Glossina palpalis.*—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 828-832.

Several cases of human trypanosomiasis were discovered amongst the native pupils of the Agricultural Station at Koulikoro in the French Sudan. Some of these had been there for many years. Other cases were seen in the native village. A careful inspection of the neighbourhood was made and *Glossina palpalis* was found at a ford on a much frequented stream where natives were accustomed to drink and wash. The banks of this stream have been cleared and the patients are undergoing treatment. It is considered that this small endemic centre will disappear.

A. G. B.

RINGENBACH. **Contribution à l'Etude de la Distribution de la Maladie du Sommeil en Afrique Equatoriale Française (Pays Bakongo, Bakongui et Loango) Mai-Juin-Juillet 1912.**—*Bull. Soc. Path. Exot.* 1913. Jan. Vol. 6. No. 1. pp. 34-40.

The author was instructed to make a medical inspection of the country between Loango and Brazzaville in the south of the

French Congo. Between these two places it is proposed to make a railway. Tables are given showing the result of the examinations for human trypanosomiasis. 92 cases were found among 3,048 natives examined. In one village, of 82 persons examined 16 were found to be infected. Many of these were related. This is considered to support the hypothesis of family infections which was formed by the French Commission in 1907 (see *Sleeping Sickness Bulletin*, Vol. 1, p. 70). *Glossina palpalis* was found on the streams all along the route, together with other biting flies. The paper is illustrated by a sketch map.

A. G. B.

SCHWETZ (J.). **Les Glossines et la Maladie du Sommeil dans la Vallée de la Lukuga.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1913. Jan. Vol. 17. No. 2. pp. 37-54.

The contents of this paper correspond in most respects with that of another noticed in this *Bulletin* (No. 1, p. 56). It is stated in addition that trypanosomes were found in two natives living in the Lukuga Valley. There are two illustrative sketch maps.

A. G. B.

Southern Rhodesia.

According to a despatch from Dr. A. M. FLEMING, Medical Director, Southern Rhodesia, dated November 29th, 1912, ten cases of trypanosomiasis had been found at that date in the Sebungwe district of Southern Rhodesia. The first case was a European, H. R. T. (see this *Bulletin* No. 5, p. 275) who was taken ill in March 1912 and died the same year in London. The other cases, all in natives, were found by Dr. F. O STOHR. All the patients had visited or resided in the valley of the Busi river, where *G. morsitans* is prevalent. This part of the country is thinly populated and remote from a European settlement. The natives are to be moved out of the fly area which is not extensive.

A. G. B.

AMERICAN TRYPANOSOMIASIS.

DIAS (Ezequiel). **Die Krankheit Carlos Chagas. Haematologische Studien.** [Haematological Studies in Chagas' Disease].—*Memorias do Instituto Oswaldo Cruz.* 1912. Vol. 4. No. 1. pp. 34-61.

The author met with great difficulty in the selection of cases for his researches because so many of the patients with 'parasitic thyroiditis' suffered also from ankylostomiasis and malaria. After selecting his cases from a part of the country where there was no malaria he was obliged to eliminate 38 of 57, mainly owing to the presence of ankylostomes and other entozoa. 19 pure cases alone remained. More than 54 per cent. of the sufferers from this disease have also ankylostomiasis. An account of the technique is given; the corpuscles were counted by Thoma-Zeiss, the haemoglobin estimated by Fleischl. The blood figures for normal persons at Rio de Janeiro—men, women, and children—as obtained by the author in 1903, are given. It is noted that the haemoglobin percentage is less than that of other authors.

Of the nineteen patients one only had an acute infection, six showed the pseudomyxoedematous form, seven the cardiac form, three the nervous form, and two infantilism. In the acute case it is noted that the polynuclears were 12·8 per cent. and the large lymphocytes 59·02 per cent. This macro-lymphocytosis at the expense of the neutrophiles seems to be typical of the acute infection. Details are given of the blood findings in the other classes of cases, and again when the cases are classified as men, women, and children.

When the author began the enquiry he expected to find very marked changes in the blood. In the sequel he was surprised to find how small the changes were. With regard to anaemia, even in the children the red corpuscles exceeded 5,000,000; the haemoglobin was 50 per cent., a 'slight degree' of oligochromaemia. He notes that *Trypanosoma cruzi* is less a parasite of the blood than of the tissues. It appears that only in the acute form is there leucocytosis; after the acute stage it is seldom seen.

As to the leucocyte formula, at the early stages of the disease there is a considerable macro-lymphocytosis, with a slight micro-lymphocytosis; later there is a gradual decrease of lymphocytes and a proportionate increase of neutrophiles, eosinophiles, and mast cells. The following table illustrates these points:—

—	Small lymphocytes.	Large lymphocytes.	Polynuclear neutrophiles.	Polynuclear eosinophiles.	Mast cells.	Eosinophile myelocytes.
	%	%	%	%	%	%
Acute infection ...	20·08	59·02	12·8	0·2	0·1	—
Recent cases ...	26·1	33·0	30·7	5·4	0·4	0·33
Pseudomyxoedematous form.	14·4	30·7	40·5	9·6	0·3	0·08
Nervous form ...	19·7	24·1	38·4	11·3	0·8	0·06
Cardiac form ...	13·09	19·07	55·3	7·5	0·4	0·02

With respect to this table it is noted that the pseudo-myxoedematous and nervous forms were in children who could not have been very long infected, whereas the cardiac forms were in adults whose infection probably went a long way back.

Lastly, a comparison is made with the conditions found in sleeping sickness. The author takes the figures of Greig and Gray, preferring them to those of Low and Castellani or of Martin, Leboeuf and Roubaud, because Greig and Gray seemed to him to have selected cases free from ankylostomiasis, filariasis, and malaria. Greig and Gray found that there was no anaemia, that lymphocytosis was constant, and that the mast cells and eosinophiles were increased. With regard to their finding that on the approach of death the number of red cells went up, this was not shown to be the case in Chagas' disease. The following are the conclusions:—

1. In Chagas' disease there is, as a rule, no globular anaemia; there is always a definite decrease in haemoglobin and in the specific weight of the blood.
2. Leucocytosis, slight in acute cases, is exceptional in the chronic form.
3. In the acute infection and in fresh cases there is a marked macrolymphocytosis at the expense of the polynuclears.
4. In cases of long standing one finds usually eosinophilia, slight basophilia, and the occurrence of eosinophile myelocytes.
5. The haemoleucocyte formula of Chagas' disease is very similar to that of sleeping sickness.

The paper closes with details of each case observed.

[GREIG and GRAY examined the blood and tabulated their results in the case of 57 natives with sleeping sickness at Entebbe. It is, however, very doubtful whether they excluded cases infected with malaria, entozoa, or filariae. In those parts of Uganda where sleeping sickness infection is contracted, especially on the shore of the Victoria Lake, all these infections are extremely common, and it is doubtful whether any native case of human trypanosomiasis could be found at Entebbe which would not show one or more of the above conditions. It is therefore open to doubt whether Dias' figures are comparable with those of GREIG and GRAY].

A. G. B.

GUERREIRO (Cezar). **Urologische Untersuchungen bei der Krankheit von Carlos Chagas.** [Urological Investigations in Chagas' Disease].—*Memorias do Instituto Oswaldo Cruz.* 1912. Vol. 4. No. 1. pp. 66-74.

These observations refer to 31 cases of American human trypanosomiasis of different clinical forms, none being acute. Details of the methods employed in the analyses are given. The forms investigated were the cardiac, the nervous, the chronic, and two cases of infantilism. The conclusion is that in this disease a slight degree of liver insufficiency occurs, as well as insufficiency of other glands. It was present in all the forms investigated except in the pure cardiac form. In chronic forms of long standing the liver insufficiency seems to be still more marked. Tables are given.

A. G. B.

BLANCHARD (M.). **Généralités sur la Trypanosomiase Américaine.**—*Ann. d'Hyg. et Méd. Coloniales.* 1912. Oct.-Nov.-Dec. Vol. 15. No. 4. pp. 772-780.

The author gives an account of the discovery of American trypanosomiasis and of the parasite *Schizotrypanum cruzi.* The symptoms are briefly described under the headings—acute cases; chronic cases, with five forms: *viz.* pseudomyxoedematous, myxoedematous, cardiac, nervous, chronic with acute exacerbations; and thirdly, the 'meta' affections, infantilism, cretinism, goitre, etc. The outlines of the pathological anatomy are given.

A. G. B.

MISCELLANEOUS.

LAVERAN (A.) & MESNIL (F.). **Trypanosomes et Trypanosomiases.** 2nd Edition. pp. viii. + 1000, 198 text-figures, and 1 coloured plate. 1912. Paris: Masson et Cie. [25 fr.]

In the introduction to this book, dated October, 1912, the authors note that in 1892 it was possible to sum up our knowledge of the trypanosomes in an article of 12 pages. In 1904 they wrote a book of 418 pages on the same subject and the present volume contains no less than 999 pages. This edition is therefore more than double the size of the last and is little less than double the size of the English edition by NABARRO (1907). It is divided into a General part containing 248 pages, and a Special part, the rest of the book. The greater portion of the first part is new. In the Special part sleeping sickness, including *T. rhodesiense* infection, receives 120 pages and there are new chapters for the African trypanosome infections caused by *T. togolense*, *T. soudanense*, *T. cazalboui*, *T. congolense*, *T. pecorum*, *T. nanum*, *T. pecaudi*, the trypanosome infections of equines of Central America and the human infection caused by *Schizotrypanum cruzi*. The trypanosomes of invertebrates have a chapter, and lastly, there is an appendix on the invertebrate transmitters. This edition contains 148 text figures as against 81 in Nabarro's edition. It may be noted that a figure by BRUCE and his collaborators showing the development of *T. vivax* in *G. palpalis* appears with the label *T. cazalboui*. Another figure shows the pulmonary cysts which CARINI associated with *T. lewisi*; from DELANOE's recent work it is probable that these cysts have nothing to do with the trypanosome. No one who is concerned with trypanosome research or practice in trypanosome affected countries can afford to be without this book. Unfortunately it lacks an index, hardly compensated for by the table of contents.

A. G. B.

NUTTALL (G. H. F.). **The Herter Lectures. II. Trypanosomiasis.** —*Parasitology*. 1913. Jan. Vol. 5. No. 4. pp. 275-288.

This lecture was delivered at the Johns Hopkins University, Baltimore, Maryland, U.S.A., on October 9th, 1912. After a general discussion of the subject the author considers in turn Sleeping Sickness; Nagana; Some other Glossina-transmitted trypanosome infections; Chagas' disease; *Trypanosoma boylei*, Lafont; The rat trypanosome and its mode of transmission; Leech-transmitted trypanosomes of fish, reptilia and amphibia; and Powers of adaptation shown by trypanosomes. He concludes with a few words on preventive measures. With reference to the differentiation of species he writes:—

> "In some cases, morphological characters sufficiently differentiate the species, but our confidence in some of these characters has been shaken since we know that a species of trypanosome may alter its appearance in changing its host. Whereas the immunity reactions have been used to differentiate species of trypanosomes, a means of distinguishing species to which no zoologist will agree, we now know that this means of differentiation cannot be relied upon since the virulence (an obscure character) of the parasites can be considerably modified experimentally."

With regard to the reservoir question he writes:—

“The wide range of pathogenicity possessed by *T. gambiense* renders it certain that it must, in nature, find reservoirs in other animals than antelope . . . Birds, reptiles and amphibia appear to be immune.”

[The last sentence is not strictly correct, as fowls have been infected with *T. gambiense* (see *Sleeping Sickness Bulletin*, Vol. 4, p. 277).]

The lecture is well worth perusal.

A. G. B.

NEWSTEAD (R.). **On the Characteristics of the Newly Discovered Tsetse-fly, *Glossina austeni*, Newstead; with Descriptions of the Genital Armature of *Glossina fuscipleuris*, Austen, and *Glossina longipennis*, Corti.**—*Bull. Entom. Research.* 1912. Dec. Vol. 3. No. 4. pp. 355-360.

Newstead writes that of the species possessing dark hind tarsi the only one that *G. austeni* can possibly be confused with is *G. tachinoides*. The former may be distinguished at once by its narrower front and also by the bright colour of the abdomen and the presence of the dark lateral stripes on the thorax. In the original description he said that *Glossina austeni* bore a somewhat close resemblance to a dwarfed specimen of *G. fusca*; now that he has examined a larger number he says that the general colour of the abdomen is most like that of *G. longipennis*. A description of *G. austeni* is given. Mr. FILLEUL, who found the specimen that forms the type of this species, writes that it is found in Jubaland together with *G. pallidipes* and *G. brevipalpis* within half a mile of water. It is considered by the natives to be deadly to cattle. The editor states that besides specimens from the Juba river he has received this species from Portuguese East Africa.

There are figures of the male armature of the three species named in the title. Newstead writes that *G. fuscipes*, Newst. described as a distinct species must sink as a well-marked race of *G. palpalis*.

A. G. B.

BOYCOTT (A. E.) & PRICE-JONES (C.). **Experimental Trypanosome Anaemia.**—*Jl. Pathology & Bacteriology.* 1913. Jan. Vol. 17. No. 3. pp. 347-366.

The authors' observations have been made on rats and rabbits infected with nagana (*T. brucei*). The rats developed a well-marked septicaemia and died in three to eight days. No anaemia was found in them. Rabbits on the other hand became anaemic more or less quickly in nearly every instance. Most of the animals were killed for experimental purposes. Death seems to occur naturally in four to six weeks. Four types of the general course of the illness are shown graphically in figures. The fall in the haemoglobin percentage is most commonly fairly rapid; the haemoglobin reaches a point of about 60 per cent. of the normal figure in about fourteen days and remains at approximately the same level for perhaps two or three weeks. The body weight usually remains approximately unaltered for two or three weeks and then falls rather quickly. These points are shown in tables. In fourteen animals the total quantity of circulating haemoglobin and the blood volume were determined. It was evident that at least five had a good deal too little haemoglobin. The greatest rate of destruction was about ten per cent. per day.

The most obvious feature in stained blood films was the relative absence of signs of regeneration. In some instances the red cells appeared to be entirely normal. The whole picture was different from what is seen during active regeneration either after haemorrhage or after blood destruction; it seems clear from the films that blood regeneration is either much depressed or takes an abnormal course. This conclusion was confirmed by the examination of the marrow, the details of which are given in tables. In six out of nine rabbits there was little or no evidence of erythroblastic activity. It is concluded that the response of the marrow is defective, not because the stimulus is inadequate, but because the nature of the infection exercises some inhibitory effect on the generation of red cells. No systematic observations were made on the leucocytes; it was, however, noticed that the anaemic animals generally had a leucopenia, corresponding with the inhibition of marrow activity. The only uniform feature in the differential counts was the excess of large mononuclears, natural to a protozoal infection. The normal figure for rabbits being four or five per cent., in the infected animals it often reached ten to fifteen per cent. The same change was shown in the marrow counts. In the ears of infected rabbits, especially in association with the pricks made to obtain samples of blood, curious oedematous patches developed. In the juice expressed from these trypanosomes were found abundantly, while the patches themselves and the immediately surrounding tissues were packed with leucocytes, almost exclusively finely granular oxyphil cells.

It is not clear to the authors how far the anaemia of the animals may be due to the imperfect marrow activity. There is evidence however that active blood destruction goes on. The lymphatic glands all over the body are distinctly enlarged and often congested. In such glands there is more or less phagocytosis of the red cells by the endothelial cells; the process seems to be more active in the peripheral than in the mesenteric glands. The organs gave a more or less pronounced reaction for free iron, as shown in tables. In the disintegration of red corpuscles after phagocytosis the cells break up into more or less spherical granules, but enough of this pigmented material was never found to account for the amount of phagocytosis which is commonly seen. What seems to happen is that the remains of the red blood cells are transported to the liver and spleen where they undergo further decompositions. This is probably the origin of red cells inside leucocytes (?endothelial cells) in the peripheral blood in human cases of malaria and trypanosomiasis (Connal). The authors believe that when red cells are injured so that they will shortly dissolve in the circulation they are taken up by phagocytic cells. They do not think that in the red cell destruction there is any direct action of the parasites, since these were exceedingly sparse. They could obtain no evidence that the trypanosomes were haemolytic *in vitro*. The summary is as follows:—

> "Rabbits infected with *Trypanosoma brucei* became anaemic owing to the destruction of red cells by phagocytosis in the lymphatic glands. The response of the marrow is generally defective, and the anaemia is therefore persistent. The iron of the destroyed haemoglobin is stored in the liver and spleen."

A. G. B.

Nattan-Larrier (L.). **Contribution à l'Étude de l'Action de la Bile sur les Trypanosomes.**—*Bull. Soc. Path. Exot.* 1913. Jan. Vol. 6. No. 1. pp. 24-28.

The author, after briefly mentioning the work of other investigators, summarises the experiments performed by him during 1911. He used the strain of *T. brucei* which was blepharoplastless (Werbitzki strain). The inoculated animals, usually mice, were killed when the trypanosomes were very numerous. The blood was citrated and centrifuged. The layer containing trypanosomes was collected and added to physiological saline solution. The mixture was centrifuged again. After decantation an equal quantity of physiological saline was added to the bottom layer. The bile used was obtained fresh from oxen in most cases and was filtered through a Chamberland filter. Occasionally desiccated bile was used after being dissolved in salt solution. Details of experiments are given on (a) the action of bile on trypanosomes, (b) treatment with bile, and (c) attempts at immunization.

In his conclusions the author states (1) that he found bile to be trypanolytic, (2) that the subcutaneous inoculation of filtered bile or of desiccated bile in solution has no curative action on *T. brucei*, and (3) that the inoculation of emulsions of trypanosomes treated with bile does not confer immunity on mice.

H. B. F.

Oehler (R.). **Ueber die Gewinnung reiner Trypanosomenstämme durch Einzellenübertragung.** [Pure Trypanosome Strains obtained by Transmission of. Single Trypanosomes.]—*Centralbl. f. Bakt.* 1 Abt., Orig. 1913. Jan. 23. Vol. 67. No. 7. pp. 569-571.

Oehler considers that all cultures, to be pure, should be the descendants of a single, isolated, individual cell. Such pure cultures have long been in use by workers on fungi and yeasts. "Pure" strains of trypanosomes in laboratories are not really pure cultures, in that the organisms are not descendants of one single trypanosome only. Oehler describes a method whereby a single trypanosome can be isolated and then inoculated into an animal such as a mouse, when a pure culture could be obtained. Full details are given of his method which can only be shortly summarised here. (1) Blood containing trypanosomes is either diluted with salt solution in capillary tubes until the trypanosomes are sufficiently far apart to enable them to be isolated, or the blood is centrifuged. Great care is needed to prevent adhesion of trypanosomes to the capillary tube in the first case, while the organisms often are deformed by the centrifuge. (2) Isolation of the single trypanosome is effected by cutting out the portion of glass tube containing it, the capillary being under observation under the microscope, and thus the entity of the trypanosome being known. This is a delicate operation. Capillary tubes of ·02 mm. bore and ·01 mm. wall thickness are recommended. (3) Inoculation of the single trypanosome is effected by the transference of it in the portion of glass tube to the needle of a hypodermic syringe and injecting either intravenously or subcutaneously. Ten cases out of 31 succeeded, four different strains being employed. The trypanosomes were visible in four to six days. The incubation period was not prolonged.

Oehler thinks, as a result of his work with such pure cultures, that serum-fast and arsenic-fast strains of trypanosomes are to be regarded as cell variations and not as evidence of selective power. He suggests that by this method it may be possible to decide whether in natural infections pure or mixed infections are present.

H. B. F.

BELTZER (A. W.), KOHL-YAKIMOFF (Nina), & YAKIMOFF (W. L.). *Trypanosoma equiperdum* **en Russie d'Europe.**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 822-825.

Dourine is wide-spread in Russia. The authors record the geographical distribution and the difficulty of trypanosome diagnosis, as well as the measures taken by the Russian Government and veterinarians to cope with the disease. MIESSNER of Bromberg first found *Trypanosoma equiperdum* in 1909 in an infected horse of Russian origin. A little later ZWICK and FISCHER isolated the trypanosome from dermal plaques and they were able to infect laboratory animals. Beltzer first isolated the trypanosome in Russia at Riasan. The morphology and measurements of the flagellate are discussed in detail, and compared in a table with the measurements of the organism given by other observers in various parts of the world. The authors consider that there is "biological identity" between the various specimens of *T. equiperdum* from different sources.

H. B. F.

BIOT (R.) & RICHARD (G.). **De la Possibilité d'Inoculer le** *Trypanosoma lewisi* **à d'autres Animaux que les Rats.**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 826-827.

Details are given of the successful inoculation of *Trypanosoma lewisi* from the heart-blood of white rats into three jerboas (*Bipus gerbo* from Tunis). The incubation periods were 5, 20 and 4 days respectively. One of the jerboas died in 8 days, after exhibiting prostration, petechiae on the thorax and actual haemorrhages. When *T. lewisi* from the jerboa was inoculated back into the rat there was "no modification in the evolution of the parasite."

A dormouse (*Myoxus nitela*) was successfully inoculated with *T. lewisi* from the blood of one of the jerboas afore-mentioned.

Trypanosomes were seen in the blood of the dormouse next day. The animal died at the end of the seventh day after inoculation, after exhibiting prostration, dyspnoea, irritability and often somnolence.

The authors conclude that *T. lewisi* is not so limited to rats as was at one time supposed, and in certain circumstances (as in the jerboa and dormouse) the virulence of the parasite seems susceptible of increase.

H. B. F.

Roudsky (D.). **Sur un Corpuscle Temporaire de *Trypanosoma lewisi* et de *Tr. duttoni*, simulant à Certaines Phases de son Evolution, un Deuxième Noyau.**—*Compt. Rend. Soc. Biol.* 1912. Dec. 27. Vol. 73. No. 37. pp. 730-732.

The author deals with *Trypanosoma lewisi* in mice and *T. duttoni* in rats; that is, the trypanosomes were living in animals other than their natural host.

Under certain conditions, not yet fully understood, a round corpuscle occurs in front of, or by the side of the blepharoplast. This corpuscle stains red with Giemsa, but somewhat less deeply than the nucleus. This new structure is three or four times the size of the blepharoplast. It contains fine basophile granulations lying in a basophile sap. Its volume increases simultaneously with the condensation of the granules to form a pseudo-karyosome. Later the granules arrange themselves at the periphery of the corpuscle and simulate "chromosomes," while the centre of the body contains a very few fine granulations. In the end all the granules disappear and thus a large round homogeneous vacuole is produced. In one case only, a homogeneous mass staining like the cytoplasm occupied the position of the corpuscle. The author wonders whether this is the final stage in the evolution of the corpuscle, which has then changed its chemical and staining reactions.

The trypanosomes in which the corpuscles occur have markedly elongate posterior extremities. They have never been seen in dividing trypanosomes, nor have they been found in *T. lewisi* when in the rat, nor in *T. duttoni* in the mouse.

Roudsky asks whether the formation of the corpuscle may be a function of the change of host. The paper is illustrated by six text-figures.

H. B. F.

YAWS.

KERR (William M.). **A Report on the Prevalence of Framboesia (Yaws) in Guam, and its Connection with the Etiology of Gangosa.**—*U.S. Naval Med. Bull.* 1912. Oct. Vol. 6. No. 4. pp. 549-552.

The author investigated the incidence of yaws in certain districts of Guam by a house to house canvass and found that 73·8 per cent. of the natives examined had had the disease. He then examined the records of 315 cases of gangosa and found that 85 per cent. of these patients had had yaws in the past, and many of them gave a positive Wassermann reaction.

He concludes as follows—

"(a) That yaws is exceedingly common in Guam.

"(b) That yaws is an antecedent factor in gangosa.

"(c) That yaws is responsible for the positive [Wassermann] serum reactions which have been obtained in gangosa, leprosy, and other diseases in Guam as well as in apparently normal natives.

"(d) That yaws in the different households in Guam explains the apparent family relationship which has been reported as occurring in gangosa and the positive serum reactions which have been obtained in blood relatives (brothers and sisters) of those afflicted, showing no lesions of gangosa."

A. Castellani.

DEGORCE (A.). **Un Cas de Pian avec Roséole Papuleuse.**—*Bull. Soc. Méd.-Chirurg. de l'Indochine.* 1912. Nov. Vol. 3. No. 9. pp. 617-619. With 2 photographs.

The author briefly describes a case of yaws in a native from the Province of Ha-dông, Indochina, in which the whole body was covered with a syphilitic papular roseola, in addition to the typical lesions of yaws. There was no evidence of any syphilitic infection and the author regards the roseola as one of the manifestations of yaws. The paper is accompanied by two plates illustrating the condition.

E. Hindle.

HARPER (P. H.). **Report on the Treatment of Fijian Yaws and Syphilis in Indians by "606" in 1911. Fiji.**—Received in Colonial Office, November 27, 1912.

During a period of four months, 36 cases of yaws and 15 of syphilis have been treated at the Colonial Hospital, Suva, by means of injections of salvarsan. A 1 in 10 aqueous solution of the drug was employed and the injections were made intravenously, intramuscularly and subcutaneously respectively. In addition, three cases were treated by the injection of serum from a treated patient.

In one case the intravenous injection of 0·6 gm. of the drug was followed by the death of the patient. This was a female Fijian, about fifty years old, who had suffered for many years from a chronic yaws ulcer of the breast. As she also presented a chronic yaws cachexia the author administered a full dose and the patient died five days later. Death is supposed to have been due to an overdose of the drug and the author considers that 0·2 gm. would have been a more suitable dose.

Four other cases were also more or less unsuccessful: (1) An adult male Indian suffering from syphilis was treated with a subcutaneous injection of 0·4 gm. of salvarsan. Nine days later he was apparently cured but was given another subcutaneous injection of 0·3 gm. before being discharged. Seven weeks later he returned with syphilitic ulceration of the nasal septum. Later the salvarsan had to be removed by incision from both the injection areas.

(2) An old Fijian woman with tertiary yaws of the nose and palate, and a deep ulcer on the side of the tongue. She was injected intravenously with 0·2 gm. of salvarsan and half an hour later had a rigor. Later her condition improved and 0·3 gm. were injected intramuscularly. About three weeks later the patient left hospital. Her general condition was much improved and the ulcer and growth were cleaner and smaller. The growth might have been a carcinomatous condition supervening on chronic yaws irritation.

The remaining two cases described as failures were only injected with the serum from other treated cases and both gave more or less doubtful results.

The author remarks that the drug does not appear to have a selective influence on any of the races treated. The greater liability of Fijians to albuminuria following intravenous injections is only apparent and is considered to be due to the fact that yaws is a more severe disease than syphilis.

The treatment of yaws by salvarsan is very economical, for before its introduction the average stay in hospital of yaws patients was over 45 days, whereas after salvarsan was employed this period was reduced to less than 20 days.

E. H.

Koch (C. A.). **Ueber Frambösieheilung durch Salvarsan.** [Treatment of Framboesia by Salvarsan.]—*Berlin. Klin. Wochenschr.* 1912. Dec. 30. Vol. 49. No. 53. pp. 2483-2485.

The author briefly discusses the relation of yaws to syphilis with especial reference to the clinical features of the disease in Surinam (Dutch Guiana). He points out that although the two are very similar there are certain differences which serve to distinguish them. Thus the primary lesion of yaws is very rarely situated on the genital region but commonly on the foot, and moreover it is usually transmitted by contact with objects that have been soiled by the secretions from a suppurating yaws pustule.

In Surinam the blacks are nearly all infected and one of the reasons which conduces to the spread of the disease is the practice of the natives of selling their clothes for a few centimes before entering the hospital.

The author has tested the effect of injections of salvarsan on over 2,000 patients, and the results have been so favourable that at the present time the hospital is free from any cases of yaws. Adults were injected with 0·4-0·6 gms. of the drug administered intravenously. From the sixth day the ulcers began to disappear and after a fortnight the majority of the patients were cured, with the exception of 0·5 per cent. of the cases which required a second injection. The article is accompanied by six figures illustrating the effect of the treatment on the surface lesions of the disease.

E. H.

MOUCHET (R.) & DUBOIS (A.). **Le Traitement du Pian et de la Syphilis par le Salvarsan dans la Pratique Indigène.**—*Bull. Soc. Path. Exot.* 1913. Jan. Vol. 6. No. 1. pp. 14-19.

The authors state that syphilis is common at Leopoldville, while yaws is frequently met with in every part of the surrounding districts. They have often seen in yaws patients peculiar nodules in the proximity of the articulations and consider the condition to be JEANSELME's "juxta-articular nodules." The natives believe that the condition is a late manifestation of yaws and the authors suggest that researches should be carried out on the subject. The authors have used salvarsan extensively in both syphilis and yaws with extremely good results; they prefer an alkaline solution to an acid one, and advise a dose of 0·01 gm. of the drug per kilogram of weight. [The condition known as JEANSELME's juxta-articular nodules is due to a fungus: *Nocardia carougeaui* BRUMPT 1910; it is to be noted, however, that in Africa nodules induced by *Filaria volvulus* may closely simulate it.]

A. C.

BROCHARD (V.). **Dix Cas d'Administration du "606" par la Voie Buccale.**—*Bull. Soc. Path. Exot.* 1913. Jan. Vol. 6. No. 1. pp. 20-22.

The author first experimented on himself by taking 0·10 gm. of salvarsan dissolved in 1 cc. of soda solution to which 100 cc. of water was added. No untoward symptom having resulted, he administered the drug in the same manner but in larger doses (0·40-0·50 gm.) to nine patients suffering from yaws, with very good therapeutic results. The drug should be administered on an empty stomach and the patient should not touch food for two hours. The author considers this method to be a useful one for children.

A. C.

DESTRUCTION OF BITING ARTHROPODS AND TICKS.

Bourret (G.). **La Désinfection Antimoustique au Moyen de la Quinoléine.**—*Bull. Soc. Path. Exot.* 1912. July. Vol. 5. No. 7. pp. 556-561.

Legendre (J.). **De la Désinfection Culicidienne par la Quinoléine.** —*Ibid.* Nov. No. 9. pp. 739-744.

Both these papers have to do with investigations on the destruction of mosquitoes by means of quinoline. When this substance is vaporised over a lamp, in quantities of half a gram for every cubic metre of space, in rooms under natural conditions, with no special precautions to obliterate apertures, all mosquitoes are killed in two hours. Probably the toxicity would be even greater if the quinoline was volatilised. Its use is simple and requires no special apparatus. It evaporates without taking fire and there is no smoke. The disadvantages lie in the cost and the disagreeable and persistent odour accompanying its use. The authors find that the toxicity is greater than that of the crésyl recommended by Bouet and Roubaud (*see* below).

C. M. Wenyon.

Bouet (G.) & Roubaud (E.). **Expériences de Désinfection Stégomycide par le Crésyl.**—*Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 627-633.

Experiments were conducted to test to what extent the agents commonly employed (sulphur, formol, pyrethrum powder) in the destruction of mosquitoes in habitations were reliable. Cages of muslin containing mosquitoes (*Culex, Stegomyia, Urranotaenia*) were placed in various parts of a room of 43 cubic metres capacity, all apertures of which had been carefully occluded. Some of the cages were suspended from the wall, others were placed on the floor while some were enclosed in loose meshed osier baskets. The temperature in the room was below 25° C. Two types of formol apparatus were employed, viz.—the " Fumigator Gonin " and the " Hélios." As a result of the experiments, details of which are given, the authors conclude that formol is not a sufficiently powerful culicide. The results obtained with the " Hélios " apparatus were slightly superior to those with the " Gonin." The cost of such disinfection becomes as high as 18 francs per 100 cubic metres.

Similar experiments were conducted by fumigation with pyrethrum powder, but the results were far from satisfactory. Fumigation with tobacco (10 grams per cubic metre), as used with success by Bourret and d'Anfreville in Saint-Louis, gave good results but the cost (3 francs per 100 cubic metres) and the unpleasant nature and persistence of the fumes renders this an undesirable agent. Mixtures of tobacco and pyrethrum powder (1 part tobacco to 3 parts of pyrethrum), used in a quantity of 5 grams per cubic metre of space to be disinfected, gave good results and were less disagreeable.

The experiments were extended and after trying camphor, phenol, quinoline, creosote, etc., the authors discovered that crésyl gave very good results when evaporated in an iron pan over a flame. When evaporation was nearing completion a grumous residue was left and this was liable to take fire and produce abundance of black fumes if the pan was allowed to be too near the flame. This can easily be avoided by the use of suitable iron pans (16 cm. high by 35 cm. broad) with sides high enough to prevent the residual mass coming in contact with the flames beneath. Heating can be carried out by means of an alcohol lamp or Primus burner. The experiments were carried out with great care and natural conditions were exaggerated by wrapping the cages in clothes and enclosing them in baskets. It was found that the penetrating power of Crésyl, 5 c.c. per cubic metre of space with exposure of 3 hours, was superior to sulphur in a quantity of 10 grams for 5 hours exposure. The authors believe that for the following reasons this agent will be of great service in the future:—1. Crésyl (or its derivatives creline, creoline, lysol) can be obtained easily in all the colonies in case of epidemics. 2. The cost is low, francs 0·30 for 100 cubic metres, requiring 5 grams per cubic metre. 3. The vapour is inoffensive and individuals can enter the rooms during the disinfection. 4. The fumes do not injure metal and other materials. 5. There is no persisting disagreeable smell afterwards. 6. The fumes are sufficiently dense to act efficaciously in imperfectly closed apartments.

The authors have found that cresol and cresylic acid may be substituted and that these products have the advantage of leaving no inflammable residuum. The action on mosquitoes and house flies in doses of one gram per cubic metre is quite as good as that of crésyl in doses of 5 grams. The cost works out at over twice that of crésyl and the authors believe that the much more easily obtained crésyl will be found to be more practicable.

C. M. W.

THIROUX (A.). **De la Destruction des Moustiques Adultes dans les Locaux Mal Clos et en particulier dans les Barraques en Bois.**—*Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 633-637.

The author has tested the action of tobacco as a culicide when employed on buildings which cannot be effectually sealed to prevent escape of fumes or mosquitoes—as for instance those with walls of wooden planks badly fitting together and with thatched or tiled roofs with numerous apertures. The experiments were conducted in two such buildings each of a capacity of 24 cubic metres, one of which was covered completely with an impermeable tent well fixed down at the sides in the sand. In each case 480 gms. of tobacco were burned in a charcoal fire for two hours and mosquitoes were exposed in cages in various parts of the buildings. In one experiment, conducted on a day when there was little wind, all the mosquitoes were dead in both houses. On a second occasion on a windy day many of the mosquitoes in the uncovered building escaped, especially those in cages on the windward side, but in the covered building all were killed. It is thus clearly demonstrated that the covering of such buildings with an impermeable tent is the only means of effectually destroying all the mosquitoes, so that the author considers that the sanitary service in Senegal should be supplied with about ten such tents, to be used in the destruction of mosquitoes.

C. M. W.

D'ANFREVILLE (L.). **La Lutte contre les Moustiques à Saint-Louis du Sénégal.**—*Bull. Soc. Path. Exot.* 1912. Oct. Vol. 5. No. 8. pp. 637-640.

This paper records the results of the efforts to exterminate mosquitoes in Saint Louis during the past eight years. Much has been done to fill up and drain stagnant pools and to prevent the formation of collections of water which might serve as breeding places. The greatest difficulty has been with the cisterns and tanks in the private houses, which through the incorrigible negligence of the native inhabitants often contain larvae. A system of inspection by a brigade has had good results, so much so that Saint Louis is the only large town of Senegal which has not been attacked by yellow fever in recent years.

C. M. W.

BISCHOFF. **Vernichtung der Wanzen in militärischen Gebäuden mittels Salforkose.** [The Destruction of Bugs in Military Quarters by Means of Salforkose.]—*Deut. Militärärzt. Zeits.* 1912. Sept. 20. Vol. 41. No. 18. pp. 681-694.

The paper describes a new substance for destroying bugs and other verminous insects. The preparation is a proprietary one devised by a chemist in Magdeburg and is named "Salforkose." Its composition is not given, but sulphur is evidently its most potent constituent. A special apparatus for developing the fumes is described. The price of this is 40 marks; a kilogram of "salforkose" costs 1·50 marks, a reduction being made if ordered in larger quantities. The apparatus and drug can be obtained from Albert Scholtz, Hamburg 6, Neuer Pferdemarkt 19. The author of the paper vouches for its efficacy in destroying bugs, lice, moths, fleas and other troublesome insects.

G. C. Low.

RUCKER (W. C.). **The Bedbug.**—*U.S. Public Health Rep.* 1912. Nov. 15. Vol. 27. No. 46. pp. 1854-1856.

The author gives a brief account of the life history and habits of the common bedbug. As regards their destruction, this is difficult once they have found lodgment in a house. The first thing to do is to discover their place of concealment and to destroy it. For this purpose the paper may have to be taken from the walls, or if this is not practicable it should be thoroughly pasted down in the places where it has become loosened. Benzine and kerosene may be injected behind wainscotings or applied to floor cracks. Oil of turpentine, corrosive sublimate, or boiling hot water may be used for the purpose of destroying both the adults and the eggs.

None of the insect powders are particularly effective. Fumigation by burning sulphur in the proportion of two pounds to the 1,000 cubic feet of air space, after closing all the cracks, is efficacious. The gas should be allowed to remain in the fumigated room for from four to five hours. Hydrocyanic acid gas is of course very efficient, but it is a dangerous and highly poisonous agent. One way to produce it is to place common commercial sulphuric acid in an ordinary granite or earthen vessel and then, after having made sure that there will be no further cause to enter the room, to drop into the acid a thick paper bag containing potassium cyanide. Quickly leave the room, close the door tightly, and seal up any cracks around it with paste and paper. Great caution should be used in entering the room again, and it must be thoroughly aired before occupation. This method of fumigation should be applied only by experts.

Of enemies the bedbug has two, the ordinary cockroach and the little red house ant, but it is questionable whether it is wise to introduce these insects into a house for the purpose of destroying the bugs.

G. C. L.

BLACKLOCK (B.). **On the Resistance of** *Cimex lectularius* **to various Reagents, Powders, Liquids and Gases.**—*Ann. Trop. Med. & Parasit.* 1912. Dec. 30. Vol. 6. No. 4. pp. 415-428.

The habits, food supplies and life history of the bed-bug were first studied. Next, experiments were done with powders of many kinds, beginning with well-known proprietary and patent insecticides, and continuing with other powders of vegetable and mineral origin. Liquid preparations were then tested, and finally the action of certain gases.

The conclusions reached are summed up as follows:—

"1. *Cimex lectularius* whether in the larval or adult stage is not readily killed by depriving it of human blood.

"2. It may thus remain alive and active for months in houses which have ceased to be inhabited.

"3. Houses on being re-occupied after being empty for months may still be found infested with bugs.

"4. Bed-bugs may transmit certain diseases from one human being to another. Therefore, it is inadvisable that bugs and human beings should occupy the same house.

"5. Human beings must be protected from the attacks of bed-bugs.

"6. There is no evidence that bed-bugs can be cleared out of a house by insecticide powders. Experiment suggests that powders are of very limited utility.

"7. The same applies to liquid remedies.

"8. Gaseous substances present the best prospect of success.

"9. Of such substances, sulphur dioxide is cheap and effective.

"10. Sulphur dioxide gas under pressure for two minutes, kills with certainty all stages in the cycle of development of the bug, including the egg."

G. C. L.

BLACKLOCK (B.). **The Resistance of *Ornithodorus moubata* to various Sheep-Dips.**—*Ann. Trop. Med. & Parasit.* 1912. Dec. Vol. 6. No. 4. pp. 429-433.

Various sheep-dips, such as Cooper's, Little's, Savar's, Hayward's Yellow Paste and MacDougall's dip, were used. Observations were made when the dip was still moist on the skin of the animal, and when it had dried. Frequently the ticks fed well, but sometimes they refused to feed under these conditions. As those ticks, which would not feed, refused usually to do so when placed on normal skin used as a control, their failure to feed can hardly be attributed to the prophylactic action of the applications, but should more probably be attributed to the condition of the ticks themselves.

As regards curative experiments the ticks were allowed to feed on the shaved skin of an animal, and while still feeding, the various dip solutions were applied to them at varying intervals after the commencement of the meal, the dips being poured into the feeding glass, completely covering over the parasites.

In other instances ticks were placed in test tubes and the dip solutions poured over them, care being taken that the parasites were completely covered by the solution, this being effected by means of a piece of blotting paper which prevented the ticks rising to the surface of the fluid.

Blacklock's conclusions are as follows:—

"1. The dips tested failed very frequently to prevent *Ornithodorus moubata* feeding on an animal.

"2. Feeding ticks were not easily caused to loosen their hold by them.

"3. In test tube experiments the resistance of this species of tick to these substances in solution is marked.

"4. Used in the strength recommended and for the time suggested these dips appear to have very slight effects on this tick.

"5. Possibly other ticks behave in a different manner under these applications."

G. C. L.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. I.] 1913. [No. 10.

PLAGUE.

Seventh Report on Plague Investigations in India issued by the Advisory Committee appointed by the Secretary of State for India, the Royal Society, and the Lister Institute.—*Jl. of Hygiene, Plague Supplement* 2. 1912. [Issued Jan., 1913.] Reports xlviii. to lxiii. pp. 207-402.

xlviii. **Plague in Madras City.** pp. 207-220. With 1 chart.

Though Madras is the third largest city in India, and has a population of more than half a million souls, plague has never been prevalent with the exception of a limited outbreak in 1905-1906. The risk of importation by sea is lessened by the fact that ships discharge their cargo into small boats, and are unable to come alongside the wharfs. The city however is brought into the closest communication with plague-infected districts by its railways. The climatic conditions between November and February are not unfavourable to the spread of the disease 1,220,686 rodents have been destroyed in the city since 1906, of which approximately 50 per cent. were *Mus rattus*, 22 per cent. mice, 24 per cent. bandicoots, and 3 per cent. musk-rats. The absence of *M. decumanus* is noteworthy. The Madras *M. rattus* is exceptionally susceptible to plague; a dose of an emulsion of a plague rat's spleen which kills 20 to 40 per cent. of *M. rattus* from Bombay, Poona, or Belgaum, destroys 95 to 100 per cent. of Madras rats.

The immunity of Madras from plague cannot be explained by absence of rat-fleas, for an average of 4 *X. cheopis* were counted on 11,897 *M. rattus*, but this figure is lower than those of plague centres; for instance it is 9 in Poona and 19 in Belgaum.

The energetic measures taken by the Sanitary Administration appear to be the chief cause of Madras' freedom from plague.

xlix. **Statistics of the Occurrence of Plague in Man and Rats in Bombay, 1907-1911.** pp. 221-226.

During the period 1907-1911, 24,756 deaths from plague occurred in Bombay; 563,784 rats were examined, among which 14,991 *M. rattus* and 60,614 *M. decumanus* were found to be infected.

The phenomena observed in Bombay in 1905-1906 have been repeated year by year. The epizootic first appears among the *M. decumanus*, then invades *M. rattus*, and shortly afterwards man is attacked.

M. decumanus suffers rather more than twice as severely from acute plague as does *M. rattus*. The probable explanation is that the average number of fleas found on *M. decumanus* in Bombay is rather more than twice that found on *M. rattus*.

l. The Distribution of White-bellied *Mus rattus* in Bombay Island. pp. 227-228. With 1 map.

Eight per thousand of 315,557 Bombay rats were the white-bellied form of *M. rattus* known as *M. alexandrinus*.

In the most densely populated quarters their ratio was only 1 per thousand, but in the least populous areas it rose to 26 per thousand.

li. The Immunity of the Wild Rat in India. pp. 229-265. With 1 map.

Twenty-three series of experiments were undertaken in which groups of rats from various towns and cities, usually 100 in each, were inoculated with one-hundredth to one-fifth of a milligram of a plague-rat's spleen. Altogether 9,843 rats received such a dose as represented from 12,000 to 200,000 plague bacilli. The resistance of the rats varied with the local prevalence of plague: thus no less than 97 per cent. of 1,390 rats obtained from plague-free Madras died of the infection, but only 38 per cent. of 1,387 Bombay rats, and 33 per cent. of 1,355 Poona rats succumbed. Both the latter cities have suffered severely from plague annually. The places investigated fall into three groups.

(1) Places which have suffered severely and almost continuously from plague for ten years or more.

Only 10 per cent. of the rats of Belgaum, where the incidence of plague has been very heavy, died. No more than 18 per cent. of 414 Cawnpore rats succumbed. The mortality of 349 Lucknow rats was 34 per cent. In six other plague spots the percentage ranged from 37 to 42. Nagpur alone of the places in this group gave susceptible rats, 97 per cent. of which died of the inoculation.

(2) Places in which the incidence of plague has been small.

The susceptibility of the Madras City rats was mentioned above. Raipur (Central Provinces) and the following five towns in the Madras Presidency have had little plague and give susceptible rats, Vaniyambadi, Calicut, Palghat, Podanur, and Coimbatore, though they were rather more resistant in the last-named place where plague had prevailed extensively during the three years before the investigation.

(3) Places which have been free from plague.

Rats from the plague free localities Banda (United Provinces), Madura (Madras), Dacca (Assam) were as little immune as those from Madras City.

The immunity of resistant rats depends largely on the dose of bacilli inoculated. It is difficult to convey plague by the bite of one flea, and only 2 per cent. of Poona rats and 6 per cent. of Bombay rats died of plague when they were subjected to the attacks of many infected fleas. 24 and 31 per cent. succumbed to an inoculation of 1/100 mgm. of plague-rat spleen, 26 and 42 per cent. to 1/20 mgm., but when the dose was increased to 1/5 mgm. 77 per cent of Poona rats and 78 per cent. of Bombay rats died.

It is probable that the resistance is due not merely to the immunisation of the rats during a previous plague epizootic, but to selective influences by which the more susceptible rodents are destroyed in an epizootic. Young rats reproduce the resistance of their parents with remarkable fidelity.

Bandicoots are as susceptible to plague as Madras rats. Mice were relatively immune whether they were captured in a plague infected area or not.

Summary—

"1. Rats from different places show varying degrees of immunity to plague.

"2. This immunity is relative to the infecting dose.

"3. Immunity is greatest in places which have suffered most severely from plague, less marked in those places which have suffered to a moderate extent and least in those places in which epidemic plague has not occurred.

"4. This immunity is not always acquired from an attack of plague, and is transmitted by the parents to their offspring which have not been exposed to infection."

lii. **Chronic or Resolving Plague.** pp. 266-286. With 1 chart and 1 plate.

The lesions of resolving plague are, chronic buboes, necrotic areas in the spleen, chronic abscesses in the spleen and liver.

Resolved or post-plague lesions are adhesions of the spleen to the surrounding structures, scars in the spleen, bisected or trisected spleen, fibrous thickening of its capsule, perisplenitis.

27,699 *M. decumanus* caught in Bombay were examined, 0·57 per cent. of which showed signs of resolving plague, and 1·47 per cent. resolved plague.

Of 27,889 *M. rattus* 0·15 per cent. bore evidence of resolving plague and 0·77 per cent. resolved plague.

Chronic buboes, mostly cervical, were found in 42 per cent. of resolving lesions of *M. decumanus*, abscesses of spleen in 24 per cent., necrotic areas in spleen in 34 per cent.

Adhesions were present in 55 per cent. of the resolved lesions of *M. decumanus*, scars in 17 per cent., bisected spleen in 17 per cent., and perisplenitis in 11 per cent. The respective ratios for *M. rattus* were nearly the same.

Resolving plague was found in 0·4 per cent. of 148,287 *M. rattus* trapped in Poona. Resolved plague in 0·46 per cent.

Lesions similar to those of resolving and resolved plague, although the *B. pestis* was absent, were found in 0·23 per cent. of 15,523 rats caught in Madras City which has been free from plague since 1905.

The pus of buboes in 78 rats was examined; cultures were sterile in 27; pure growths of *B. pestis* were obtained in seven, although the pus had failed to infect guinea-pigs: the contents of the buboes of seven induced plague when injected subcutaneously into these animals—the cutaneous method of inoculation often fails to infect when the *B. pestis* are few in number. In 18 per cent. of these cases organisms which resembled *B. pestis* were seen microscopically, but cultural and animal experiments were negative.

Fifteen per cent. of the necrotic areas in the spleen of 74 rats contained *B. pestis* fatal to guinea-pigs; in 3 per cent. this bacillus was isolated by culture, although the animal test failed; in 4 per cent. rods resembling *B. pestis* were seen in smears; and in 32 per cent. the cultures were sterile.

The pus of 15 out of 36 abscesses of the spleen or liver infected guinea-pigs; in 2, cultures of *B. pestis* were obtained when the inoculation test was negative; in 5, plague-like rods were found microscopically.

A chart is given in which are traced the curves of acute plague, resolving, and resolved plague by months; both the latter are at their maximum during, or immediately after, the highest point of the acute plague tracing, and fall nearly to zero a year later. Therefore it is probable that the life of a wild rat does not greatly exceed a year.

Conclusions.—

"1. Lesions, for which we propose the terms resolving and resolved plague lesions, are found in rats which have been subjected to plague infection and in certain individuals are stages in the natural process of recovery from the acute form of this disease.

"2. These lesions are very different from the lesions found in the acute stages of the disease. They are generally localised and confined for the most part to the spleen.

"3. It is not always possible to prove that these lesions are due to the plague bacillus by isolating that bacillus from them, for in many cases the bacilli have been killed, have disappeared or been replaced by some other organism.

"4. That the lesions are frequently produced by the plague bacillus has been shown by (a) demonstrating the presence of plague bacilli in some of these lesions which exactly resemble others, either in the same rat or other rats, in which no plague bacilli can be found, (b) by showing that the lesions increase in numbers during and after epizootics of the disease.

"5. Nevertheless the fact must be borne in mind that very similar lesions can be produced by other causes, as has been shown by our experience of the examination of rats in Madras city, where the disease is not present."

liii. The Experimental Production of Resolving Plague and Post-Plague Lesions in Rats. pp. 287-291.

1,079 rats which had survived inoculation with the plague bacillus were killed three weeks later; 11 per cent. showed resolving or resolved plague lesions. The largest proportion of changes occurred in the survivors of the most susceptible rats; thus all except 18 of 1,000 Madras rats died after inoculation, and 9 of the 18 survivors bore signs of having passed through an attack of plague. The converse holds true, for resolving plague lesions were present in 5 only of 160 Poona rats which survived inoculation out of 300 tested.

Ninety-one per cent. of the rats which contracted a fatal infection died in the first week; 7·5 per cent. in the second week; and 1·5 per cent. in the third week.

liv. Experimental Plague Epidemics among Rats (Fourth Communication). pp. 292-299.

Five to 15 inoculated and 15 uninoculated rats were put into each of six rat-houses, from three of which fleas were excluded. In eight experiments 46 per cent. of the 360 uninoculated rats in the flea-infested houses were infected and died, but only one of the 360 uninoculated rats in the control rat-houses succumbed, and in this instance 4 fleas had gained access. These experiments confirm those already published on the spread of plague from infected rats to their healthy companions through the agency of fleas.

In most of the tests the proportion of rats which contracted the disease varied with the number of fleas present. The degree of septicaemia in the infecting rat was a marked factor, for when the number of *B. pestis* in the blood of the inoculated rats was small, the fleas transmitted plague to 33 per cent. of 105 healthy rats, when the number was high the ratio rose to 63 per cent. of 150 rats. The bubo was cervical in 88 per cent. of 167 rats thus infected.

Conclusion.—

> "As regards the mortality in the different epizootics it appears therefore that the flea prevalence and the degree of septicaemia developing in the infected rats were the chief influences at work."

lv. Observations on Flea Breeding in Poona. pp. 300-325. With 7 charts.

Egg Laying.—*X. cheopis* caught on the bodies of recently killed *M. rattus* were transferred to test-tubes by means of a platinum loop, five to each tube. When kept in the dark, the female fleas lay the largest proportion of their eggs during the first hour of their incarceration; they were therefore retained in the tubes for this period, and the eggs were then counted. The results of several thousand experiments show that within certain limits of temperature, the number of ova deposited varies with the humidity; for example, in August 1911, when the average humidity was 85·5 per cent. of saturation, 130 fleas laid 314 eggs, which equals 2·4 eggs per flea. In April 1910 when the humidity was 30·3 per cent. only, 127 fleas deposited an average of 0·6 egg per flea.

95 fleas kept in tubes for one hour at a temperature from 70°-84° F. in an atmosphere, the humidity of which was 44-65 per cent., laid on an average, 1·5 eggs each. When the cotton wool plug was moistened with water, 45 fleas gave an average of 2·4 eggs per flea.

Fleas were placed in tubes the air of which had been dried with calcium chloride, and were kept for one hour at temperatures of 13°-20° C.; 24°-28° C.; and 35°-39° C. The temperature 24°-28° C. was most favourable for egg-laying, 1·8 eggs per flea; 13°-20° C. next, with 0·07 egg per flea; and the high temperature was least favourable, with 0·03 per flea; 45 fleas were used in each series.

Egg Hatching.—32·6 per cent. of 5,543 ova exposed to diffused sunlight hatched, and 32·9 per cent. of 5,571 eggs kept in the dark.

In August 1910, 32·6 per cent. of 731 eggs hatched when the humidity was 86·8 per cent. but the percentage was 3·4 in 178 eggs when the humidity was 44 per cent. of saturation.

In the cooler months of the year the period of incubation is prolonged; for example in December 1910, when the temperature was 67° F., 43 per cent. of the eggs hatched, but not until 7-12 days after laying. On the other hand, in May 1910, when the temperature was 85° F., the larvae appeared on the 5th and 6th days, though only 11 per cent. of the eggs were fertile.

Raising the humidity is favourable to the hatching of eggs during the dry months. Drying the air is inimical: 148 eggs were kept in calcium chloride tubes, but they were all sterile.

The seasonal variations in egg laying and hatching run together; more than twenty times as many larvae were obtained in September and October when it was warm and wet, as in April and May when it was hot and dry.

Development of the Larvae.—The greatest proportion of fleas was obtained from larvae in June—9 from 40; nearly the same ratio in July—19 from 94; but in August only 16 out of 133 larvae reached maturity, and 8 of 167 in September: none attained the adult stage in the remaining months of the year.

40 fleas developed from 614 larvae kept under natural conditions, and the larvae remained active on an average of 19 days. 46 fleas developed from 568 larvae confined in an atmosphere saturated with water, and 26 days was the average period of activity of the larvae.

Length of Life of a Flea.—Fleas deprived of food lived longest in August; the average life of 55 fleas was 4·6 days, when the humidity was high, namely 85 per cent. of saturation. When the saturation was reduced to 45 per cent. in April and May, 55 fleas survived for an average of 0·74 day only.

The addition of moisture prolongs the life of fleas, especially in the hot and dry months. The mean duration of life of 140 fleas kept without food under normal conditions was 3 days, but when the air was saturated with moisture 120 fleas lived for an average of 4·8 days each. When the air was dried the mean duration of life of 90 fleas was 1·3 days.

Groups of 65 fleas were kept at temperatures of 98°-104° F.; 55°-85° F.; and 55°-65° F. deprived of food. The mean duration of life of the first group was 0 14 day; of the second 1·17 day; and of the third 1·66 days.

64 newly hatched fleas lived without food 7·2 days each on an average. 2·6 days was the mean duration of life of 545 fully grown fleas under similar conditions.

These experiments show that fleas conveyed in luggage or merchandise may be the means of transmitting plague over considerable distances.

The results of artificial breeding harmonise with observations on the prevalence of fleas in nature. The onset of wet weather in June marks an increase in egg laying and hatching which causes the abundance of adult fleas which is noticed in July.

Summary.—

"1. The laying of eggs by wild fleas, the development of the eggs into larvae and the development of larvae into pupae and imagines all show a marked seasonal variation, being most active when the weather is wet and the temperature moderate and least active under dry and hot conditions.

"2. Within the range of temperatures obtaining in Poona, atmospheric humidity seems to be a more important factor than temperature in conditioning this seasonal variation.

"3. Artificial humidification of the atmosphere is favourable to all stages of the metamorphosis especially in the dry season.

"4. The seasonal variations in the results of artificial breeding correspond in time to the seasonal variations in the prevalence of fleas on rats in nature.

"5. The life of an adult flea is longer in a cool and moist atmosphere than under hot and dry conditions."

A chart is given in which are shown the percentages of the number of eggs per 100 fleas above and below the mean by months; of the number of larvae per 100 eggs; of the number of larvae per 100 fleas; of the life of fleas in days; of the number of fleas on wild rats; and of the incidence of human plague. The curves roughly rise and fall together.

lvi. **The Serum Treatment of Human Plague.** pp. 326-339.

Yersin serum, prepared at the Lister Institute by the injection of dead and afterwards living bacilli, and an antitoxic serum resulting from the immunisation of horses with the nucleoprotein of the *B. pestis* were employed. Doses of 500 cc. and upward were given intravenously. Alternate cases were treated with serum, 222 in all, the mortality of which was 66·2 per cent. 73·9 per cent. of the 222 control cases died. All the patients whose blood contained more than 40 *B. pestis* per cc. died, whether treated by serum or not.

The antitoxic serum possessed no advantage over the Yersin serum.

Conclusion.—

"From the whole enquiry therefore it appears that the administration of the available sera is not a practicable means of bringing about any material diminution in the mortality from plague in India."

lvii. Rowland (Sydney). **Attempt to separate the Antigen from the Nucleoprotein of the Plague Bacillus by Filtration through Gelatin.** pp. 340-343.

The antigen of plague is associated with a nucleoprotein soluble in dilute salines. The protective value of the bacillus and of its nucleoprotein are the same. Hydrolysis affects the nucleoprotein but leaves the antigen intact; hence the two substances are not identical. Attempts to separate the antigen from the nucleoprotein by filtration through gelatin were unsuccessful.

lviii. Rowland (Sydney). **Besredka's Method of Vaccination.** pp. 344-349.

Besredka asserted that plague vaccine is deprived of its toxic properties by treatment with specific serum. Three vaccines were prepared: in one the dead bacilli were soaked in anti-plague serum; in the second normal horse serum was used instead of the specific; and in the third physiological salt solution took the place of the serum. The lethal dose of the three emulsions did not differ greatly when rats were inoculated.

The amount of endotoxine which could be extracted from plague bacilli before and after soaking in serum was determined by washing the respective suspensions, mixing with anhydrous sodium sulphate, powdering the solid mass, adding enough water to form a saturated solution of sodium sulphate, filtering, and extracting the residue with water. The nucleoprotein was estimated by weighing the precipitate obtained on boiling with acetic acid. The yield of nucleoprotein was nearly the same in every case, and experiments on rats showed that its toxicity was not lessened by the immune or normal horse serum.

Immune horse serum contains opsonin, and normal horse serum an amboceptor for the plague bacillus.

Besredka's statement that sensitised organisms yield an atoxic vaccine was not confirmed.

lix. Rowland (Sydney). **The Relation of Pseudo-Tubercle to Plague as evidenced by Vaccination Experiments.** pp. 350-357.

B. pseudo-tuberculosis rodentium resembles *B. pestis* in every respect except virulence to rats. It causes fatal infections in guinea-pigs, however, the post mortem appearances of which are similar to those arising from *B. pestis*. Moreover immunity to plague is conferred on guinea-pigs by vaccination with the pseudo-tubercule bacillus.

Broth cultures of pseudo-tubercle were killed with chloroform and were injected into 44 guinea-pigs. Their first dose amounted to about one quarter of an agar slope, the second was double this quantity; one month later their immunity was tested by inoculating them with 1/10 cc. of a broth culture of a virulent plague bacillus. All the 44 animals were protected; nine out of ten control guinea-pigs which received a similar dose, died of plague. It is not possible to immunise rats by this method, for all of 37 vaccinated rats died when inoculated with plague.

The nucleoprotein obtained from the pseudo-tubercle bacillus is harmless to guinea-pigs and rats in doses as large as 10mg., but it had no protective influence against plague on 26 rats and 26 guinea-pigs which had been vaccinated with 0·01mg. On the other hand the nucleoprotein of the plague bacillus is toxic for rats and has immunising powers, but it is harmless to guinea-pigs and confers no immunity. It may be stated generally that the efficiency of a vaccine is correlated with its toxicity.

Growing bacteria in the presence of their own products lowers their virulence. Conversely, to maintain the virulence of a micro-organism, the culture should be kept under such conditions as will reduce the rate of growth to a minimum; subcultures on the most favourable medium are then incubated at a temperature at which the rate of growth will be greatest.

Ten rats were inoculated with virulent plague bacilli which had grown for two days in broth containing plague nucleoprotein, none of these died of acute plague, but four died after the fifth day. Of ten rats inoculated at the same time with the same culture grown in ordinary broth seven died of acute plague.

The nucleoprotein plague culture postponed the death of ten guinea-pigs into which it was inoculated, and the post-mortem appearances were changed from those of acute plague to those typical of pseudo-tubercle in its most usual form. Hence the plague bacillus which has been grown in nucleoprotein solution is indistinguishable from the pseudo-tubercle bacillus of rodents.

Summary.—

" 1. The plague bacillus is equally virulent for guinea-pigs and rats, but whereas it is easy by either the whole bacillus or the contained nucleoprotein soluble in saline to immunise the rat against plague it is almost impossible to immunise the guinea-pig, either by means of the bacillus or its nucleoprotein.

" 2. The pseudo-tubercle bacillus is almost without pathogenicity for rats whereas the guinea-pig is susceptible to it.

" 3. It is easy to immunise the guinea-pig against plague by means of the pseudo-tubercle bacillus; very difficult to immunise the rat.

" 4. It was not found possible to immunise either the rat or the guinea-pig against plague by means of the nucleoprotein contained in the pseudo-tubercle bacillus.

" 5. Whereas the nucleoprotein of the plague bacillus grown on broth agar is toxic for rats it is hardly so at all for guinea-pigs. The nucleoprotein obtained from the pseudo-tubercle bacillus is relatively innocuous to either rats or guinea-pigs."

lx. Rowland (Sydney). **Observations on the Mechanism of Plague Immunity.** pp. 358-366.

When emulsions of plague bacilli are inoculated into the peritoneum of normal animals, the first effect is the exudation of mononuclear leucocytes, followed in the third hour by the appearance of polynuclears and active phagocytosis; flakes of fibrin form in which the bacilli are entangled, and these become attached to the great omentum which retracts on them. Death takes place before the blood stream is invaded by bacilli.

In the immune animal the number of plague bacilli at any stage is much smaller than at a corresponding period in the normal animal.

On subcutaneous inoculation it is found that the local reaction is much less in the immune rat than in the normal; the unvaccinated rat provides a good culture medium, the immune rat a bad one; hence it is probable that the essential factor in plague immunity is one which affects the multiplication of the bacillus.

In investigating the rates of multiplication of plague bacilli in normal and immune rats, the most satisfactory method of counting consists in the use of the 8 mm. apochromatic of Zeiss with his aplanatic condenser, both with central stops and a special counting chamber without lines. The dark ground effect is perfect.

Normal rat serum is bactericidal to *B. pestis*. Twenty million plague bacilli incubated at 37° C. in normal rat serum were reduced to half a million in 10 hours. If the serum had been deprived of its complement by heating at 55° C. for half an hour it proved a favourable medium and multiplication was rapid.

In parallel experiments with unheated rat serum in which increasing amounts of the endotoxine contained in the plague bacillus had been added to a series of tubes the preliminary lysis occurred, but the rate of multiplication of the survivors was accelerated by the endotoxine which induced chain formation. When the experiment was repeated with immune serum, a much larger amount of the endotoxine was required to bring about this result.

lxi. ROWLAND (Sydney). **The Onset and Duration of the Immunity consequent on the Inoculation of Plague Nucleoprotein.** pp. 367-372. With 2 charts.

The injection of nucleoprotein, either freshly prepared or after autolysing for two months, caused no protection to 80 rats inoculated with plague within 18 hours of its administration. The curve of immunity rapidly ascends after this interval, being at its highest point on the third day. The more toxic the vaccine, the greater is the immunity, and the earlier it is acquired; but after the fourth day the differences disappear and the curve remains at the same level for months. Three months after the injection of 0·1 mg. of nucleoprotein 19 rats survived the test inoculation; and 85 per cent. of 20 rats which had received 0·01 mg. were protected. At five months 60 per cent. of 31 rats were saved.

lxii. BROOKS (R. St. John). **The Opsonic Index in Plague Vaccination.** pp. 373-386. With 5 charts.

The author contributed a paper on this subject to the *British Medical Journal* (see this *Bulletin*, No. 6, p. 318). Charts are now given in which it is seen that the opsonic curve falls nearly to zero on the fourth day after inoculation, but the immunity curve remains high for weeks.

lxiii. MACCONKEY (A. T.). **The Preparation of Antitoxic Plague Sera.** pp. 387-402.

The most constant preparation, which was used as a test toxin, was obtained by mixing plague bacilli with anhydrous sodium sulphate, melting the solid mass which formed at 37° C., stirring, and solidifying in a shallow basin cooled by ice. This crystalline product was dissolved in 0·85 per cent. salt solution at 36° C., cooled at 0° C., and filtered immediately before use.

Filtrates of broth cultures are unstable and weak. Solutions of plague nucleoprotein give anomalous results unless they are fresh; in the dry condition also, it was unreliable.

Considerable difficulties were experienced. In the first place 30 per cent. of the rats survived the dose of toxin which was fatal to the rest; paradoxical results occurred, for example 1 cc. of a serum failed to neutralise 3 minimum lethal doses of toxin, but 0·04 cc. was sufficient. Although the serum was not poisonous when quantities as great as 10 cc. were injected, yet many rats which had recovered from the immediate effects of the toxin-serum mixture, died later in a condition of marasmus.

The toxin used for immunisation of horses was freshly prepared solution of plague nucleoprotein, and the dose is given in milligrams of nucleoprotein contained in it. One horse in three months received 1,340 mg. of fresh toxin, equal to 4,000 rat M.L.D., or the growth from 380 Roux bottles; it yielded a serum of which 1 cc. neutralised 400 rat M.L.D. Another horse was immunised with 3000 mg., or the growth from 860 Roux bottles; the titre of its serum was 150 only, hence the individuality of the horse is a factor in immunisation. In the case of horses which have been immunised already, old weakened toxin appears to stimulate the production of antitoxin better than fresh toxin, and causes less constitutional disturbance.

An attempt was made to increase the value of the serum by GIBSON's method which is used in concentrating diphtheria antitoxin. On mixing equal volumes of serum and half saturated solution of ammonium sulphate a precipitate forms; this is collected and extracted with brine; the brine filtrate is precipitated with 0·25 per cent. acetic acid. The precipitate is collected, made alkaline with sodium carbonate and is dialysed against water. There was an increase in the antitoxic value of some plague serum thus treated to the extent of one and two thirds, but on the whole there was a loss of one third of the antitoxin.

Summary.—

"1. It is possible to obtain a plague antitoxic serum by means of injections of toxin obtained from the plague bacillus by Rowland's sulphate process. So far however the antitoxic value has not been high. The usual neutralising power has been 300-400 rat M.L.D. per c.cm. and on only one occasion was a value of 750 M.L.D. reached.

"2. In an immunised horse one obtains a better response, as regards antitoxin production, if one uses an old weakened toxin instead of a fresh toxin.

"3. Plague serum retains its antitoxic properties for months unimpaired.

"4. Heating at 56° C. for ½ hour on each of three successive days has no effect on the antitoxin.

"5. Plague antitoxin may be concentrated by the same process that is used for concentrating diptheria antitoxin."

C. Birt.

SIGNORELLI (E.) & CALDAROLA (P.). **Ricerche di Agglutinazione con Differenti Razzi di Bacilli della Peste.**—*Annali d'Igiene Sperimentale.* 1912. Vol. 22. (New Series.) Part 4. pp. 555-567.

The following cultures of the *B. pestis* were used:—

1. "Kharbin," isolated from a case of pneumonic plague in February 1911.
2. "Mukden" from pneumonic plague in March 1911.
3. "Martini" from a septicaemic case of pneumonic plague.
4. "Bombay" from bubonic plague in 1897.

5. "Mongolia" from a case which occurred in an epidemic of bubonic and pneumonic plague at Weitschang in 1898.
6. "Wladimirowka" in the Astrakhan bubonic epidemic of 1900.
7. "Odessa" from a bubonic epidemic in 1910.

Emulsions of 48-hour cultures of these were heated for 45 minutes at 65° C. and injected into rabbits in three or four increasing doses at a week's interval. The animals were bled seven days after the last inoculation.

The *B. pestis* forms stalactitic growths in broth; hence such cultures are unsuitable for agglutination tests; but by growing the bacillus on agar at 35° C. for twenty-four hours, followed by incubation at 15° C. for another day, uniform emulsions can always be obtained.

In every instance the serum of the rabbit clumped the culture with which it had been immunised in higher dilution than those necessary to clump the other strains. Thus the Kharbin serum clumped the Kharbin emulsion in 1:75 and the Bombay strain in 1:15 dilution. Similarly the Bombay serum diluted 75 times agglutinated the Bombay bacillus, but had no effect on the Kharbin bacillus in dilutions higher than 1:30.

The result of the investigation showed that there are no very substantial differences in the agglutinability of races of *B. pestis* isolated from cases in various parts of the world.

C. B.

EPIDEMIOLOGY.

i. GUITERAS (Juan). **La Peste Bubónica en la Habana.**—*Anales de la Acad. de Ciencias de la Habana.* 1912. Oct. Vol. 49. pp. 339-348.

ii. VÁZQUEZ (Antonio Cueto y). **Historia Clinica de Tres Casos de Peste Bubónica.**—*Ibid.* pp. 348-361.

iii. AGRAMONTE (Aristides). **Peste Bubónica. Consideraciones Bacteriológicas.**—*Ibid.* pp. 361-365.

iv. CAPOTE (Fernando Méndez). **La Peste y la Acción de la Casa de Salud "La Purisima Concepción."**—*Ibid.* pp. 365-370.

i. A translation of this paper appeared in the *Journal of the American Medical Association* (see this *Bulletin,* Vol. 1, No. 6, p. 314).

ii. Case 1. The onset, on June 30th 1912, was marked by fever and pains in the head and legs. Inguinal buboes appeared, accompanied with much surrounding infiltration; the *B. pestis* was isolated from the serum obtained by puncturing the glands. Pyrexia, 38° to 40° C., continued for 6 days. Recovery ensued though convalescence was retarded by suppuration of the femoral glands which were incised on the 16th day of the disease.

Case 2. The attack began on July 8th with chilliness, headache, vomiting, and fever. *B. pestis* was present in the serum aspirated from an inguinal bubo. Death took place on the fourth day and was preceded by dyspnoea and cyanosis.

Case 3. The illness commenced on July 14th with symptoms which suggested enteric fever. The blood withdrawn on the seventh day of the disease was negative to cultural tests, but the *B. pestis* was found in the serum obtained from an enlarged inguinal gland. Areas of inflammation of the skin appeared, from which the plague bacillus was procured; death supervened on the fourteenth day from adynamia.

iii. The bacilli isolated from the above three cases were shown to be those of *B. pestis* by means of cultures, complement deviation, and animal inoculation.

iv. Details are given of the precautionary measures against plague which were taken in the Institution "La Purisima Concepcion" after the occurrence of the three cases. None of the inmates were attacked.

C. B.

DEMINSKY (J.). **La Peste d'Astrakhan est-elle Endemique?**—*Vestnik Obstchestvennoi Guiguieny.* 1912. Sept. p. 1329: and *Bull. de l'Office Internat. d'Hyg. Publique.* 1912. Dec. Vol. 4. No. 12. pp. 2268-2269. (Abstract.)

*The author does not agree with the views of BELILOVSKY and KONSTANOV who maintain that plague is not endemic in Astrakhan, but that it is imported by the Mohammedan pilgrims; for, he asks, if that be so why are not the other Mohammedans in Russia attacked? He notes that plague appears almost exclusively in the sandy areas of the eastern steppes, and from a study of the spread of the disease during the last ten years he comes to these conclusions:—

1. Camels play no small part in the diffusion of plague in the Kirghis steppes; they may contract the infection and convey it to man.
2. The transmission of plague from camel to man may be explained by the fact that the Kirghis consume the flesh of camels slaughtered on account of illness.
3. It is possible that other domestic animals are also infected.
4. There is a close connection between the infection among the Kirghis and the steppes, more especially in the sandy districts.

This connection has been demonstrated by him in a most tragic manner, for while examining suspected ground-squirrels found on the steppes, he infected himself and died of pneumonic plague at Rakhinka on the 22nd of October last. He was nursed by his pupil KRASSILNIKOV who fell a victim to the disease five days later.

C. B.

BROWNE (R. H. J.). **A Case of Plague at Shotley.**—*Statistical Report on the Health of the Navy for the year* 1911. 1912. Oct. pp. 173-176.

A seaman cut his left forefinger while he was cleaning a rabbit which had been caught on the Ipswich road; he also touched another, the diseased appearance of which caused it to be rejected. Three days afterwards, on October 10th, 1911, he was attacked with fever, temperature 104° F., pains in his left axilla, where a bubo was found, and in his head, legs and back; malaise, anorexia, and vomiting and a slight cough were also noted. Pneumonia came on; the sputum contained *B. pestis* which caused the death of two guinea-pigs from plague in 6 and 7 days. The axillary bubo was incised; the wound became gangrenous; suppuration of the cervical glands supervened; iritis attacked both eyes, which ended in destruction of one, and much opacity of the cornea of the other. His temperature still fluctuated above normal limits twelve weeks after the onset of the illness. On the thirteenth day he received 50 million bacilli which had been isolated from his blood withdrawn on the tenth day; a double dose was given on the fifteenth day of the disease.

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* Summarised from the abstract in the *Bulletin de l'Office Internationale d'Hygiène Publique.*

The place where the infected rabbit was caught is about three-quarters of a mile from the houses where the cases of plague occurred in 1910 reported by BULSTRODE. It was known that a plague epizootic existed among the rats of the district at the time the seaman was infected.

C. B.

i. GUTHRIE (J. Birney). **Symptoms and Clinical Diagnosis of Bubonic Plague.**—*Southern Med. Jl.* 1913. Mar. Vol. 6. No. 3. pp. 155-157.

ii. WILSON (R. L.). **The Diagnosis of Plague.**—*Ibid.* pp. 157-160.

i. Early cases in an epidemic of plague are often overlooked; therefore in all febrile diseases it is necessary to examine the lymphatic glands and, if plague be suspected, the fluid withdrawn by puncture should be submitted to bacteriological tests. Venereal buboes, mumps, malarial and enteric fevers may be confused with plague.

ii. In this concise account of the methods employed in the diagnosis of plague there is no record of any personal observations.

C. B.

TRANSMISSION.

MARTIN (C. J.). **The Horace Dobell Lectures on Insect Porters of Bacterial Infections. Lecture ii. The Transmission of Plague by Fleas.**—*British Med. Jl.* 1913. Jan. 11. pp. 59-68: and *Lancet.* 1913. Jan. 11. pp. 81-88.

In the year 1897 OGATA induced plague in mice by inoculating them with crushed fleas taken from a plague-infected rat. In the following year SIMOND proved that plague is conveyed from animal to animal through the agency of fleas by placing a healthy rat confined in a box provided with a grating in a bottle with an infected rat; though the animals could not come in contact the healthy rat contracted the disease, which was transmitted by fleas introduced into the bottle. In 1902 **Gauthier** and **Raybaud** made five similar successful experiments. In 1904 **Verjbitski** achieved success 19 times in 116 attempts. Since that date the Commission for the Investigation of Plague in India has repeated and extended these researches, the reports of which have been published from 1906 onwards. The Commission ascertained that the *B. pestis* may occur in thousands in the stomach of rat-fleas, where they multiply and can be recovered till the twentieth day after the flea's meal on the infected rat. The faeces of the insect contain the micro-organism, which may enter the skin of man or animal through the flea-bite or the slight injuries caused by scratching. Sixty-six experiments were performed, in each of which 40 to 70 animals, some infected with plague and the rest healthy, were confined together; in 31 of these experiments in which fleas were excluded none of the healthy animals became infected, although in one case 21 plague animals were in close contact with 25 normal rodents. On the other hand, in 35 experiments in which fleas were introduced, epizootics of plague broke out among the healthy animals. Guinea-pigs and monkeys placed in infected animal houses remained free from plague when their cages were surrounded with a 6 inch strip of "tangle foot" fly-paper which was sufficient to ward off fleas, though 6 of 13 monkeys, and 18 of 24 guinea-pigs whose cages were unprotected died. Fleas rapidly forsake their dead host and betake themselves to man or other animals. Guinea-pigs do not harbour fleas as a rule, but they are convenient traps for rat-fleas. The infectivity of 142 houses where plague had arisen, or rat mortality had been noted, was tested by turning guinea-pigs loose in them; in 31 instances the animal died of plague. Ninety-two experiments were made in which two animals were placed in suspected houses, one being protected by gauze or "tangle foot"; 15 of the unprotected but none of the protected animals died. The fleas captured on the animals were carriers of the *B. pestis*, for on 26 occasions in 96 tests plague developed in the animal to which they had been transferred.

The rat-flea of the tropics is *Xenopsylla cheopis*, which **Bacot** has bred for years on human blood. The common rat-flea of temperate climates is *Ceratophyllus fasciatus*. **Martin** and **Chick** find that this species attacks man as readily as rats, for 60 per cent. of 517 attempts to feed these fleas on the human subject were successful. Martin however thinks that it is doubtful whether the *C. fasciatus* is attracted to man as readily as *X. cheopis*: it is not such an active jumper as the latter.

The *Ctenopthalmus agyrtes*, a flea commonly found on *Mus decumanus* in country places in Great Britain, refused to bite man in 107 experiments. The mouse-flea, *Ctenopsylla musculi*, only occasionally fed on the human being in 122 attempts. Martin notes that though plague epizootics occur among mice they are not associated with plague epidemics.

The seasonal prevalence of bubonic plague in rats and men is marked. In Bombay the height of the epidemic is in March, in

Lahore in April, in Jhelum in May, in Rawal Pindi in June, and further north in July to September. This is not due to periodicity in the breeding of rats, but is connected with periods when fleas are most numerous. Curves are given of a census of fleas captured on 150,000 rats, of epizootics among *M. decumanus* and *M. rattus*, and of human plague, in which it is seen that plague is epidemic when the average number of fleas is above the mean, and the height of the epidemic corresponds with the season when fleas are most abundant. In this respect observations in India, Japan, Sydney, North China, and Marseilles are concordant. Epidemics of plague decline when the mean daily temperature exceeds 85° F. ,for such a temperature in the absence of moisture kills fleas. In the Indian experiments 67 per cent. of attempts to convey plague by fleas were successful when the temperature was 73° to 78°, but only 14 per cent. when the temperature was 82° to 85° F.

Though it is possible to convey plague experimentally by means of *Pulex irritans*, yet this flea plays little or no part in the spread of plague at the present day, for the invasion of the blood by the *B. pestis* in the human infection is so much less than in the case of the rat that the chance of a human flea taking in a single bacillus is small.

The author summarizes the claims of flea transmission to be the predominating mechanism of spread from rat to man as follows:—

"1. The experimental evidence that plague is easily transmitted from animal to animal by rat-fleas.

"2. That in presence of fleas, the epizootic, if started, varies as regards severity and rate of progress with the number of fleas present and the season of the year, whereas all attempts to induce epizootics in the absence of fleas have failed.

"3. That under natural conditions (experiments in plague-houses, &c.) an animal can be protected from infection by any simple procedure which will exclude the visits of fleas.

"4. The only discovered infection in plague-houses resides in plague-infected fleas.

"5. Rat-fleas, *X. cheopis* and *Ceratophyllus fasciatus*, readily bite man.

"6. The conclusions drawn from animal experiments, when applied to the problem of the spread of plague amongst human beings, afford a reasonable interpretation of every cardinal epidemiological fact."

C. B.

TREATMENT.

D'HOSTALRICH. **Du Traitement de la Peste et de la Valeur Curative du Sérum Yersin.**—*Rev. de Méd. et d'Hyg. Trop.* 1912. Vol. 9. No. 4. pp. 225-227.

Bubonic plague prevailed in the district of Phanthiet, Annam, from February to August, 1908. According to native official reports the number of people that fell victims was not less than 2,000. Of 232 cases under the care of the author 21 were treated symptomatically, only 6 of which recovered. 190 patients received daily subcutaneous injections of 40-80 c.c. of Yersin's anti-plague serum; 128 died, which is equal to a mortality of 67·7 per cent. Large doses of serum, up to 100 cc., were given intravenously to 16 patients, who were suffering from severe infection, but four only survived. Five grave cases were submitted to a course of serum therapy, venesection, and intravenous injection of saline fluid; three recovered. There were four recoveries in nine patients to whom serum was administered within the first forty-eight hours of their illness, which was serious in all. Hence it exerts some beneficial effect if its administration is begun soon after the onset; if it be delayed till the third day or later, no good results.

C. B.

PROPHYLAXIS.

BECK (J. E.). **Prophylaxis of Plague.**—*Southern Med. Jl.* 1913. Mar. Vol. 6. No. 3. pp. 161-165.

Vessels plying between infected ports should be fumigated every three months, and moored six feet or more from the wharf, and their cables should be protected with conical galvanized iron rat-guards three feet in diameter.

At Honolulu plague was endemic, but for several years the town has been kept free by the continual warfare on rats, and by the isolation of cases. When an infected rat is discovered, the house in which it was secured is searched immediately, and rendered rat-proof; the residents are placed in quarantine. On one of the other islands of the group, where the same energy is not displayed in the campaign against plague, cases occur frequently.

Secrecy and inactivity are costly and dangerous. The authorities of a city in the Western States denied the existence of the disease in their midst and threatened personal violence to their Health Officer who reported it. Millions of dollars were afterwards spent in attempts to suppress the infection.

C. B.

HEISER (Victor G.). **Plague. A Note in Regard to Infected Houses.**—*U.S. Public Health Rep.* 1913. Mar. 7. Vol. 28. No. 10. pp. 426-427.

At Manila on December 17, 1912, two guinea-pigs free from fleas and confined in a wire cage were placed for three hours on the sleeping mat of a man who had contracted plague. Four days later one of the animals died of plague, but no fleas were discovered on it. Two houses in which plague had occurred were disinfected by spraying with kerosene and washing with a larvicide; guinea-pigs then introduced remained healthy.

C. B.

RATS AND RAT PLAGUE.

CREEL (R. H.). The Rat. Its Habits and their Relation to Anti-plague Measures.—*U.S. Public Health Rep.* 1913. Feb. 28. Vol. 28. No. 9. pp. 382-386.

A gray rat (*M. norvegicus* vel *decumanus*) was released 450 feet from the shore of San Juan Bay; it reached land in six minutes. Another swam 1,300 feet to the beach in fifty-five minutes, the first fifteen of which were spent in swimming round before it learnt its course. A *M. decumanus*, a *M. rattus*, and a *M. alexandrinus* survived 90, 45, and 35 minutes in the water respectively when they were set free 1,200 feet from land. They appeared to have no sense of direction.

In 48 hours five *M. decumanus* had burrowed downward through two and a half feet of firm soil to the circumference of a stockade made of galvanized iron sunk into the ground for a distance of 3 feet. The depth of their natural burrows is usually half to one foot, but they have been found passing beneath a wall two feet in depth. They are able to pierce lime-mortar and soft brick, but cement and concrete obstruct them. *M. rattus* and *M. alexandrinus* did not burrow when they were confined in the stockade.

A 12 inch band of zinc encircling the trunk of a cocoa-palm prevented rats from climbing the tree, but they ascended with ease a 1-inch standpipe. In one instance a *M. rattus* escaped from a smooth iron receptacle 24 inches deep.

The best bait for rats is the food to which they have been accustomed. *M. rattus* and *M. alexandrinus* have fewer cannibalistic proclivities than *M. decumanus* which it is difficult to preserve in captivity for this reason.

Summary.—

"The *Mus norvegicus*, while essentially a burrowing animal and not addicted to climbing or swimming, is nevertheless quite capable of doing either. It burrows readily in the hardest earth, even to the depth of two and a half feet, and can pass through, probably by gnawing, all wooden material, soft brick, or mortar. The black rat and the Alexandrinus (at least in Porto Rico) do not burrow at all, but are very adept at climbing and jumping, and therefore are the species chiefly found in the rural districts, removed from human habitations.

"It is possible for rats to escape from ships anchored a quarter or even half a mile from shore and make a landing, the water being smooth and tide favourable. It is questionable whether rats under natural conditions would make the attempt, though unusual conditions aboard ship might determine this kind of migration."

C. B.

RUCKER (W. C.). The Relation between Traffic and the Spread of Plague.—*U.S. Public Health Rep.* 1913. Jan. 24. Vol. 28. No. 4. pp. 163-166.

It is axiomatic that the prevention of bubonic plague depends on the prevention of the migration of rodents in traffic. Vessels, while tied to the wharf, must be debarred from receiving or discharging rats. The rat-guards must be fixed perpendicularly to the mooring cables, and must be of such a diameter that rats are unable to leap over them. Docks and ships should be constructed with bolt-holes supplied with swing doors operated from above, into which the rats can be enticed or driven by smoke, steam, sulphur dioxide, or other means, and there despatched. In the absence of these contrivances, fumigation of ships by sulphur dioxide, or carbon monoxide is the most effective means of destroying the rodents. They may be dislodged from life-boats by a jet of steam.

C. B.

MARKL. **Bakteriologische Diagnose der Rattenpest.** [Bacteriological Diagnosis of Rat Plague.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1912. Dec. 30. Vol. 67. No. 5. pp. 388-397.

SKCHIVAN reported that an epizootic in rats, which preceded an epidemic of plague at Odessa, was caused by the *B. mucosus caps.* and the *B. coli.* ZLATOGOROFF experienced difficulty in distinguishing the effects on rats of an infection due to *B. pseudotuberculosis rodentium* from those of plague; this organism is ubiquitous and is found in dust, earth, and fodder; it gives rise to glandular enlargements and effusions into the serous cavities of rats, and it is agglutinated by plague serum. AUJEZKY ascertained that a plague-like disease in rats was caused by a variety of Friedländer's rhinoscleroma bacillus; TOYAMA, SCHILLING, SACHS, and XYLANDER have studied other varieties of this group which are pathogenic to rodents. KISTER and SCHMIDT isolated one of the haemorrhagic septicaemic group of organisms from ferrets in an epizootic which occurred in Hamburg; guinea pigs were infected when cultures were applied to their shaven skin. Danysz' bacillus and its allies, *B. issatschenko, B. bristolense,* described by KLEIN, and the bacillus of NEUMANN, one of the German swine-plague family, cause fatal disease in rats, in which the post-mortem appearances bear some resemblance to those of plague (*see* this *Bulletin*. No. 2. p. 72.) The micro-organisms of this group are easily separated from plague by cultural tests.

If the body of a plague-rat be examined shortly after death, inspection with the naked eye is often sufficient to determine the cause of the infection. If however putrefaction has set in, the difficulty of diagnosis is much increased. Markl finds that all indications of plague are lost in guinea-pigs when their cadavers are kept at a temperature of 26°-28° C. for five to seven days. His observations harmonize with those of KISTER and SCHUHMACHER, ZLATOGOROFF and others. As the tissues become decomposed, the polar staining of the *B. pestis* grows more indistinct; many of the contaminating bacteria may present a resemblance to plague bacilli. Cultures fail almost invariably, from overgrowth of the plates with proteus. Nevertheless **Dunbar** and **Kister** obtained colonies of the plague bacillus on gelatine plates which had been incubated at 18° C. for five days, after inoculation with highly putrescent material derived from plague rats. To obviate death from sepsis in animal experiments, the putrid matter is applied to a shaven and slightly abraded surface of skin on a guinea-pig's abdomen; but this method does not always succeed, since the virulence of the *B. pestis* is lowered by association with putrefactive bacteria.

Fifty dead rats were found in a ship with a cargo of Indian produce; their bodies were far advanced in decomposition when they were examined by Markl, who inoculated six guinea-pigs on the shaven skin, hypodermically, and intra-peritoneally. They all survived except one which had received intraperitoneal and subcutaneous injections of the putrid matter. The *B. pestis* was isolated from its blood by gelatine culture and animal passage. Twenty rats which had been dead for a long time were removed from the hold of another ship which had come from South America: guinea-pigs survived skin inoculation with the decomposing tissues, but succumbed to peritoneal and subcutaneous injections. Friedländer's bacillus was obtained on culture, and was the probable cause of the rat epizootic.

Two cases of plague occurred on board a ship bound from Syria; dead rats had been found in the hold. Markl discovered the appearances of plague in one, but skin inoculation of guinea-pigs was without result. He isolated the *B. pestis*, however, from the decomposing remains of another rat by culture, and subcutaneous and peritoneal inoculation of a guinea-pig.

C. B.

Anderson (John F.) & McLaughlin (Allan J.). **A Plague-like Organism from a Rat.**—*Amer. Jl. Public Health.* 1913. Jan. Vol. 3. No. 1. pp. 50-52.

A rat was killed in Key West, Florida, the post mortem appearances of which somewhat resembled those of plague. There were dusky injection of the skin, slight enlargement of the inguinal glands, pleuritic effusion, yellowish areas and spots in the liver, congested spleen, and a nodule in the lung. Cultures from the lung, liver, and spleen resulted in the growth of a motile bi-polar staining rod, which fermented glucose but left lactose unchanged. Inoculation by the cutaneous or subcutaneous method killed rats and guinea-pigs. A white rat which had received an injection of anti-plague serum before inoculation died before the control animal. Though the organism grew well on salt agar, no involution forms were observed. The bacillus belonged to the Gärtner group.

C. B.

Bulletin Épidémiologique (Peste 1912).—*Bull. de l'Office Internat. d'Hyg. Publique.* 1912. Dec. Vol. 4. No. 12. pp. 2316-2323; and 1913. Vol. 5. Nos. 1 and 2.

The following table shows the distribution of plague during 1912, with the number of cases reported and the mortality:—

Localities.	Months.	Cases.	Deaths.
AFRICA:			
The Azores	Sept.-Oct.	37	22
Algiers	July	6	6
Alexandria	March-Nov.	33	15
Cairo	April-May	4	3
Port Said	May-Dec.	12	3
Egyptian Provinces ...	Jan.-Dec.	802	389
Morocco	May-Sept.	11	—
Senegal	May	4	3
Mauritius	Jan.-Dec.	642	416
Natal	Jan.-July	33	26
German E. Africa	March	69	69
British E. Africa	Aug.-Dec.	162	103
AMERICA:			
Cuba	July	4	2
Granada	May	1	1
Porto-Rico	June-Sept.	53	33
Buenos Ayres	Oct.	3	3
Brazil	Jan.-Dec.	70	57
Chili	"	63	25
Ecuador	Feb.-Dec.	233	82
Peru	Jan.-Dec.	722	299
Port of Spain	April-July	12	7
Venezuela	March-Nov.	10	7
ASIA:			
Arabia	Jan.-June	22	21
Hong Kong	Jan.-Sept.	1,848	1,729
China	Jan.-Dec.	408	396
India	1st Jan. 1912– 4th Jan. 1913.	324,276	274,804
Java	1st Jan.-31st Dec.	2,240	2,022
Indo-China	Jan.-Dec.	2,171	1,547
Persia	Feb.-June	968	730
Siam	Jan.-Oct.	28	28
Straits Settlements ...	"	46	34
Turkey (Asiatic)	Feb.-July	20	6
Japan	March-Aug.	189	143
EUROPE:			
Hamburg	Sept.	2	1
Trieste	July	2	2
Liverpool	April and July	2	1
Tyne	Sept.	1	1
Kirghis Steppes	Oct. 1911-Feb. 1912	211	190
Russia (including Asiatic) ...	Jan.-Dec.	233	190
OCEANIA:			
New Caledonia	Sept.-Nov.	25	16
Hawaii Islands	Feb.-Dec.	8	8
Philippines	April-Dec.	58	50

C. B.

LEPROSY.

TRANSMISSION.

NOC (F.). **Remarques et Observations sur le Rôle des Moustiques dans la Propagation de la Lèpre.**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 787-789.

Referring to a paper published by him in the *Annales d'Hygiène et de Médecine Coloniales*, 1903, Vol. 6, p. 483, Noc points out that he never found acid-fast bacilli in mosquitoes (*Culex* sp.?) which had been allowed to feed on lepromata, but frequently found typical lepra-bacilli in mosquitoes caught in the rooms or on the mosquito-nets of lepers. In view of the facts that some mosquitoes prefer to feed at night, and that in his experience the temperature of lepers rises in the evening, with an increased chance of bacillaemia at that period, he considers that one should not be dogmatic in regard to the improbability of mosquitoes carrying the infection, until one knows more of the habits of such kinds as occur in leper-establishments. He has frequently found lepra-bacilli in the stomachs of domestic flies caught in the neighbourhood of ulcerated lepromata.

J. Henderson Smith.

LEBOEUF (A.). **Dissémination du Bacille de Hansen par la Mouche domestique.**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 860-868.

Flies (*Musca domestica*) settle frequently on leprous ulcers left exposed, and of 23 flies caught on such ulcers known to contain many bacilli 19 were found to contain typical organisms. The bacilli were present in very large numbers sometimes, were excreted in the faeces of the flies and showed no signs of degeneration even after a day or more in the intestine of the fly. Even in flies caught in the room and not directly on the ulcers bacilli were found but less frequently; while in 8 flies caught elsewhere no similar acid-fast bacilli were observed. While *M. domestica* would thus appear to be capable of disseminating the bacillus, it apparently can be infected only from patients who present open lesions (or infected discharges); e.g., *B. leprae* was not found in 29 flies caught in the rooms of patients with only nervous symptoms or with unbroken skin lesions. Further, it was not found in 23 flies caught in a house about 160 yards from the pavilions containing advanced cases, which is taken as suggesting that the range of dissemination is not very great. Two flies of another species (*Lucilia* sp.?) were found infected on a patient with open ulcers. Leboeuf considers that transmission of the disease may occur through infected flies depositing their faeces on the nasal orifices or cutaneous wounds, perhaps especially during sleep.

J. H. S.

SKELTON (D. S.) & PARHAM (J. G.). **Leprosy and the Bed-Bug.** —*Jl. R. Army Med. Corps.* 1913. March. Vol. 20. No. 3. pp. 291-292.

The authors examined in two experiments the bed-bugs (*Cimex lectularius*) caught in the beds at Walezo Leper Asylum (Zanzibar). In the first experiment 75 live bugs were used and, after several hours' washing of the animals in normal saline, films were made of the teased intestinal contents. In the second experiment 100 live bugs were similarly washed, the fluid centrifuged and films made of the deposit. The bodies of the bugs were then ground into a powder and films of this examined. In no case were definite acid-fast bacilli seen, and only a few acid-fast granules and some doubtfully acid-fast rods were observed in some of the films of the first experiment. Bed-bugs living under natural conditions in leper beds were thus not found to contain any bacilli resembling the lepra organism, and it seems improbable that they play an important part in the transmission of the disease in Zanzibar.

J. H. S.

SOREL (F.). **Recherche du Bacille de Hansen dans les Ganglions de Personnes Saines vivant dans l'Entourage des Lépreux.**—*Bull. Soc. Path. Exot.* 1912. Nov. Vol. 5. No. 9. 698-702.

Sorel punctured a lymphatic gland (inguinal, cervical or epitrochlear) in 19 cases of manifest leprosy, and 8 times found the bacilli. In a similar examination of 15 persons living in close association with lepers but not apparently themselves affected, he obtained one positive result in an inguinal gland of a healthy married woman with a healthy child, a native of the Ivory Coast.

J. H. S.

SUGAI (A.) & MONOBE (J.). **Ueber die Vererblichkeit der Lepra und einiger anderen Infektionskrankheiten.** [The Hereditary Transmission of Leprosy and some other Infectious Diseases.] —*Centralbl. f. Bakt.* 1. Abt., Orig. 1912. Dec. 30. Vol. 67. No. 5. pp. 336-337.

In 10 out of 12 children, newly born of leprous parents, lepra-bacilli were found in small numbers in the circulating blood, and in 9 in that of the placentae also. The bacilli were also found in the blood of a newborn child, of whose parents only the father was leprous.

After intravenous injection into pregnant guineapigs of an emulsion of lepra-bacilli, whether boiled or not, the authors found in 48 hours the bacilli in the heart-blood of all the foetuses. Tubercle bacilli were found in the blood of foetuses of guineapigs similarly injected. In the semen of a guineapig, into whose testes tubercle bacilli were injected, the bacilli were demonstrated 4 days later, and a female with which it paired was found 11 days later to have tubercle bacilli in its uterus and to have a tuberculous endometritis.

Intravenous injection of *B. coli* or *B. typhosus* into pregnant guineapigs, or of *Staphylococcus aureus*, was followed by the appearance of these organisms in small numbers in the blood of the foetuses.

[No details are given as to the methods of identifying the acid-fast or other organisms used, nor as to precautions against the well-known fallacies to which such work is liable.]

J. H. S.

DIAGNOSIS.

BAYON (H.). **The Present Position of Leprosy Research.**—*S. African Med. Rec.* 1912. Nov. 9. Vol. 10. No. 21. pp. 463-471.

An account of a previous paper by the same author, which covers much the same ground as this, was given in this *Bulletin*, No. 4, p. 195. An additional interesting point is the statement, based on experience with 126 cases of leprosy, that the injection of a filtered diluted extract made from KEDROWSKY's culture produces in early cases of the disease an intra-dermal reaction, which is of use to confirm the diagnosis. The reaction consists of a typical areola which develops at the site of injection within 24 hours. Advanced cases and normal individuals give no such reaction, but nodular cases show a rise of temperature (up to 104° F.) after the injection of 1 cc. or more of the extract. Bayon considers that the employment of a simple vaccine made of the bacilli, killed but not otherwise treated, can be of no service in this disease, since such organisms are not broken up in the tissues and no antibody formation can result.

J. H. S.

PALDROCK (A.). **Eine einfache Methode, Leprabacillen in der zu untersuchenden Haut nachzuweisen.** [A Simple Method of Demonstrating Lepra-Bacilli in the Skin.]—*Dermatologisches Centralbl.* 1913. Jan. Vol. 16. No. 4. pp. 101-103.

Paldrock recommends a simple procedure, which he says gives more satisfactory results than even the somewhat elaborate mincing and filtering method of UNNA or the antiformin method of KOSLOW. The excised portion of skin is washed in distilled water till no more blood comes away, is then laid upon filter-paper to drain off the excess of water, and is finally picked up with forceps and smeared upon coverslips, pressure being exercised to express the juice and the bacilli from the piece of tissue. The coverslips are then dried in the air, fixed in the flame and stained in the usual way. Many bacilli may be found in such films in cases where the usual serum-preparation shows none or almost none.

J. H. S.

JOYEUX. **Notes sur la Lèpre en Haute-Guinée.**—*Rev. de Méd. et d'Hyg. Trop.* 1912. Vol. 9. No. 3. pp. 161-163.

Advanced cases conform fairly to the disease as seen elsewhere, and on a rough estimate about one person in every 200 shows obvious leprosy. Joyeux tried the ophthalmo-reaction of CALMETTE and von PIRQUET's skin reaction on 10 cases of definite leprosy, using tuberculin, and obtained a positive result in one case with the Calmette test. This case still gave a positive reaction one year later, although no signs of tubercle could be discovered. The most satisfactory method of diagnosing early cases is the recognition of the bacilli in the nasal mucus during an attack of acute coryza (in artificially induced coryza they were not seen). He saw no examples of rat-leprosy in a considerable number of animals examined.

In a discussion on this paper JEANSELME stated that the positive Wassermann reaction sometimes obtained in lepers does not disappear under salvarsan treatment.

J. H. S.

CLINICAL.

PARAVICINI. **Contribution au Diagnostic Clinique de la Lépre dans la Haute Cote-d'Ivoire.**—*Rev. de Méd. et d'Hyg. Trop.* 1912. Vol. 9. No. 2. pp. 132-136.

A condensed account of the clinical symptoms in both the nervous type and the less common leonine or tuberculous type, at different stages, with some points of differential diagnosis. The author points out that the frequently symmetrical distribution of the lesions in the tuberculous form does not necessarily imply an alteration in the medulla.

J. H. S.

DE BEURMANN & LABOURDETTE.—**Lèpre Nerveuse contractée en Indo-Chine. Facilité de la Contagion.**—*Bull. et Mém. de la Soc. Méd. des Hôpit. de Paris.* 1912. Dec. 19. 3 sér. Vol. 28. No. 36. pp. 741-746.

In commenting on a case of which a detailed account is given, the authors point out that while ocular lesions are much more frequent, more severe, and more intractable in the nervous type of leprosy, the lesions of the eye and especially of the cornea due to the local development of a leprome are often susceptible of satisfactory treatment. When such lesions are present, however, there is serious danger in using such therapeutic agents as leprolin, of whatever sort. Leprolins may and sometimes do induce a local congestion, which goes on to ulceration and cicatrisation, but this process occurring in the eye might lead to permanent blindness. The circumstances of the case detailed were such that infection apparently occurred in spite of a minimum of opportunity, and the authors use this to insist on the facility with which leprosy may be transmitted on occasion.

J. H. S.

DE BEURMANN, RAMOND (Louis), & LARROQUE. **Lèpre Tuberculeuse, Gigantisme et Acromégalie.**—*Bull. et Mém. de la Soc. Méd. des Hôpit. de Paris.* 1912. Dec. 19. 3 sér. Vol. 28. No. 36. pp. 714-726.

A detailed description of a case of leprosy which presents also definite signs of acromegaly. The leprosy is almost purely tubercular, the very slight disturbance of sensibility found in a small proportion of the tubercular areas being insufficient grounds for speaking of it as of mixed type. The tubercles are extremely numerous, the only skin areas free from them being the regions covered with hair, and show a tendency to a symmetrical distribution; but there is no syringomyelia and no evidence of extensive involvement of the nervous system. The facies is of leonine type, and the diagnosis, obvious at first sight, was confirmed by the demonstration of numerous lepra-bacilli in an excised tubercle. The acromegaly is definite but not pronounced. It is chiefly confined to the hands and feet, which are greatly enlarged in all dimensions with marked lengthening of the digits but there is also enlargement of the sella turcica, some enlargement of the frontal sinuses and elongation of the vertical line of the head and face. The authors discuss the possible relationship of the two conditions, but conclude that it is really a case of gigantism in course of evolution into acromegaly, with leprosy superadded as a complicating factor.

J. H. S.

TREATMENT.

PALDROCK (A.). **Sollen Leprakranke mit Salvarsan behandelt werden?** [Should Leprosy Cases be treated with Salvarsan?] —*St. Petersburger Medizinische Zeitschr.* 1912. May 1 (14). Vol. 37. No. 9. pp. 135-141.

Nine cases were treated with salvarsan, viz., 6 of lepra tuberosa, 2 of lepra maculosa and 1 of lepra nervorum, all being cases of long standing. The drug was given in acid solution in doses of 0·3-0·6 gm. intramuscularly, and the local reaction was effectively controlled by immediately applying compresses over the injection and keeping them there for 6 days. In all, 26 injections were given, 2 cases receiving 4 injections, 5 receiving 3, and the others 2 and 1 respectively. Three of the injections were followed by local necrosis; in no case did albumin appear in the urine. The injections were followed by a marked general improvement with increase in weight, local skin-lesions improved, tubercles softened, and ulcers healed rapidly. But the improvement was temporary only, and was followed by an acceleration of the progress of the disease, and Paldrock concludes that treatment by salvarsan alone cannot be recommended in cases which have already existed for some years.

In 4 of the cases the treatment was complicated by the injection of fresh complement-containing serum from animals. Paldrock was led to try this by the statement of ELIASBERG that the serum of lepers is deficient in complement. Increasing doses from about 35 cc. to over 100 cc. were given subcutaneously, each patient receiving in all from 285-325 cc. of serum. For successive injections the serum of different animals was used to avoid the dangers of anaphylaxis. Small doses produced no apparent effect, but the large doses were followed by urticaria, rise of temperature, shivering and general depression. No benefit appears to have followed this procedure.

J. H. S.

MINETT (E. P.). **The Treatment of Leprosy by Nastin and Benzoyl Chloride.**—*British Guiana Medical Annual for* **1911.** Eighteenth Year of Issue. pp. 24-33. [1913. Demerara: printed by The Argosy Co., Ltd.]

Eighteen selected cases had been under treatment with Nastin for nearly 2 years and six under treatment for from 6-9 months, before further treatment with benzoyl chloride was begun. These cases were compared with 71 cases, unselected, treated only with benzoyl chloride, and with 8 other cases left untreated. Each group included cases of nodular, anaesthetic and mixed leprosy. The benzoyl chloride treatment consisted in intramuscular injections of a 5 per cent. solution of the drug in sterilised white oleum petrolatum, and in addition a 2·5 per cent. solution was used as a spray for the nose and was painted upon ulcers and broken down nodules. The latter method of using the drug was found to be very useful, the discharges being quickly rendered free from bacilli. The intramuscular method was found to be of doubtful utility. The percentage of improvement with it was indeed slightly higher than with Nastin, which the author finds to have very little beneficial effect on cases of leprosy, but he is inclined to attribute what improvement there was to the mental effect of the new treatment and to the improved conditions of life obtained in the asylum. Anaesthetic cases run a definite course, after which the disease seems to die out and leave the patient no longer infective. Sensation may in time return to some of the previously anaesthetic areas, and after self-amputation only scars remain. This is a natural process and is not apparently influenced by either Nastin or benzoyl chloride. Nodular cases do not tend to improve naturally, except in very rare instances, and do not appear to be appreciably affected by either method of treatment. The so-called destruction of bacilli occurs in patients who have not been treated at all, varying from time to time and in different situations in the same patient. It is an unreliable guide to the effect of a given treatment.

J. H. S.

SCHUMACHER. **Zur Behandlung der Lepra mit Nastin.** [The Treatment of Leprosy with Nastin.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1913. Jan. Vol. 17. No. 1. pp. 15-17.

The effect of Nastin was tried on four natives of German East Africa, all of whom suffered from mild skin leprosy of long standing. All four received subcutaneous injections weekly, at first of Nastin B_1 for 8 weeks, and then after 14 days' interval of Nastin B_2 for 16 weeks. No general reaction was observed at any time and no reaction at the site of injection. A favourable change occurred in the spots on the skin and in the nasal lesions. The skin spots, which were originally reddish-brown in colour and showed a margin raised here and there by small nodules, at first became much darker, and soon after the B_2 preparation was commenced became distinctly black. The margins became bright red, marking off the whole spot sharply from the surrounding skin, and these in turn also eventually became black, while in the centre of the spots small areas of normal skin appeared which gradually coalesced. Two months after the last injection the spots could be recognised only by the small nodules, which had also become dark and were softer. The improvement in the nasal mucous membrane was definite, it became smooth and moist with no ulceration or scabs, and lepra bacilli could no longer be found in the discharge. Observation of the cases unfortunately could not be continued.

J. H. S.

RUTHERFOORD (T. C.). **Report on Cases of Leprosy treated with Leproline during 1911-1912 in the Bilaspur District.** (Mirror.) —*Indian Med. Gaz.* 1913. Feb. Vol. 48. No. 2. pp. 61-66. With 1 plate.

In all 32 cases occurring in natives of India were treated, but the results here given affect only 20 of these. The shortest period of treatment was 100 days, and 15 were treated for 153 days. Full details of each case with notes on its progress are given. Taken over all, it appears that 2 cases were unaltered in condition, in 15 cases deterioration was indubitable, and in 3 cases it was impossible to decide whether there had been on the whole improvement or deterioration. In the absence of a large number of controls it would be unfair to attribute the preponderance of cases that got worse to the treatment. The author considers that the deterioration was probably due to the natural progress of the disease and that the treatment did not affect it one way or the other, but in one at least of the cases the downward progress was so very marked that it is difficult not to hold the treatment as at least partially responsible. The leproline used appears to have been the preparation of ROST; it was given usually in doses of 1 cc., injected weekly.

J. H. S.

PAPELLIER (E.). **Das Luetiker Bad Kusatsu in Japan.** [The Syphilis Baths at Kusatsu.]—*München. Mediz. Wochenschr.* 1912. July 30. Vol. 59. No. 31. pp. 1718-1719.

The Kusatsu bath lies on a plateau about 4,000 feet above the sea and is the most celebrated of a cluster of some 30 hot springs which rise in the high mountain range North-West of Tokyo. Nearly a dozen separate springs issue at Kusatsu at a temperature of 60°-63·9°, and they vary considerably in the proportions of the mineral constituents they contain. One type for example contains 0·719 gm. $Al_2(SO_4)_3$ and 2·152 gm. free H_2SO_4 per litre, and another type has only 0·035 gm. $Al_2(SO_4)_3$ but 2·618 H_2SO_4. The water is led from these springs into public bathing places and to the hotels which constitute the main part of the town. The season for visitors lasts from June to September, the district being covered with snow in the winter. In the public baths the temperature of the baths is 57°-58°, and as this is too high even for a Japanese the ritual of the bathing procedure commences by all the assembled bathers stirring the water for

10 minutes. This induces a free perspiration and also reduces the temperature of the water to about 50°, at which point all pour the water over themselves, and at a given signal all plunge into the bath. After 3 minutes' immersion the bath is over and in a complete course this process is repeated 3-5 times daily for 5-6 weeks. The free acids produce in visitors (not in the local inhabitants) oedema of the sensitive parts and excoriations of the skin which become very painful, and it is usual after a Kusatsu course to visit a neighbouring spring to accelerate the healing of these lesions of the skin. Used chiefly as a cure for syphilis, Kusatsu is also frequented by lepers with, it is said, good results and even cures in early cases. There is a separate leper quarter and the lepers do not mingle with the other visitors, but the separation is not rigidly enforced and the slight precautions taken illustrate the indifference with which leprosy is commonly regarded in Japan. According to official statistics Japan has 102,585 lepers (probably an underestimate), and until recently there were no official institutions for their treatment. Even now there are only 4 or 5 asylums in the country, which can of course admit only a small fraction of the number of persons infected.

J. H. S.

LEBOEUF (A.). **La Curabilité et les Rémissions de la Lèpre en Nouvelle-Calédonie.**—*Bull. Soc. Path. Exot.* 1912. Nov. Vol. 5. No. 9. pp. 705-707.

To illustrate the difficulty of disinguishing between cure and temporary recovery Leboeuf gives 4 instances of a more or less complete remission of symptoms, which relapsed after 2, 5 and 7 years. In 6 other cases, however, he considers it probable that cure had really taken place, no relapse having occurred for in one case 8, in another case 10, and in the remainder about 15 years. JEANSELME in the discussion stated that he had performed an autopsy on a leper who had had no symptoms for 4 years, and found no other changes than vascular and interstitial sclerosis.

J. H. S.

LEPRA BACILLI IN THE BLOOD AND EXCRETA.

RABINOWITSCH (Marcus).—**Leprabacillen im kreisenden Blute der Leprakranken und im Herzblutes eines Leprafötus.** [Lepra Bacilli in the Circulating Blood of Patients and in Heart-Blood of a Lepra-Foetus.]—*Berlin. Klin. Wochenschr.* 1913. Feb. 10. Vol. 50. No. 6. pp. 252-253.

Ten cc. of blood were withdrawn from a vein in 8 patients, of whom 5 were cases of lepra tuberosa, 2 of lepra maculosa, and 1 of lepra nervorum. The blood was added to 10 cc. distilled water containing 1 per cent. sodium citrate and some sapotoxin, and after shaking was centrifuged. To the deposit, after washing in distilled water, was added 10 per cent. antiformin solution, and after 1 hour at 37° the mixture was again centrifuged, the deposit washed and finally spread on films. The blood of 5 patients was repeatedly examined in this way, and in 3 cases of lepra tuberosa lepra bacilli were found every time, in one case of nervous type only once, and on no occasion in a case of lepra maculosa. The remaining cases were examined only once, and in 2 of these, both of tubercular type, bacilli were found. They were also demonstrated in the heart-blood of a foetus of about the 6th month, found post-mortem in one of the cases of lepra tuberosa, although no signs of leprosy were apparent in the foetus itself.

J. H. S.

SUGAI (T.) & MONOBE (J.).—**Die Leprabacillen in der Milch von Leprakranken.** [Lepra Bacilli in the Milk of Lepers.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1912. Dec. 11. Vol. 67. No. 4. p. 233.

In 6 out of 10 cases examined lepra-bacilli were found in the blood, and in 2 of these also in the milk. In the one case they were present from the 6th month of pregnancy on, in small numbers. In the other case they were most numerous in the milk immediately after the birth of the child, but could occasionally be detected for months afterwards. The milk-glands of 2 lepers were also examined histologically and in both lepra-bacilli were detected.

J. H. S.

LAGANE (L.). i. **Bacillurie provoquée dans la Lèpre.**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 784-786. ii. **Bacillurie Lépreuse.**—*Compt. Rend. Soc. Biol.* 1913. Jan. 10. Vol. 74. No. 1. pp. 16-18.

i. The urine was systematically examined in three cases (1) of old mixed leprosy; (2) of mixed leprosy with symptoms of 3 years' standing and recent development of tubercles; (3) an early case with sense-disturbances and spots. In all three the bacilli were found in the local lesions, and in the first two also in the nasal mucus irregularly, but never in the blood in any of them. Bacilli were not found in the urine in spite of repeated trials, whether examined after aspirin or potassium iodide had been given or in the absence of drugs. The second and third cases were injected intravenously with arseno-benzol in doses of 0·5 and 0·6 gm. every 5-7 days, with an interval of 15 days between the 3rd and 4th injections. After the 2nd, 3rd and 5th injections in the 2nd patient acid-fast bacilli were found in large numbers in the urine, identical microscopically with lepra-bacilli and not producing tuberculosis in guineapigs, and after the 3rd and 5th injections in the 3rd patient (whose nasal mucus always gave negative results). The urine contained no albumin and no blood, and the reaction of Meyer was negative.

ii. Lagane here describes a case of six years' standing which suffered from frequent febrile attacks with formation of multiple tubercles. In the urine of this case, which had been receiving arseno-benzol, lepra-bacilli were found ten days after the last injection, but the appearance of the bacilli coincided with an acute attack of fever and a very pronounced development of tubercles. The attack lasted 20 days and the bacilli were present throughout this period in the urine. Their presence might be associated with the previous arseno-benzol treatment; but Lagane found bacilli in slides made from the urine of the same patient during an attack before the arseno-benzol treatment was begun, and he considers that the bacilluria was due to the acute attack and not to the arseno-benzol. Further, in a case of 10 years' duration, of mixed type and showing visible tubercles, he twice detected typical bacilli in the urine although no arseno-benzol had been given at any time. There was no blood or albumin in the urine nor any signs of renal leprosy or tuberculosis; the organisms were typical in all respects and were never obtained from the blood even during the acute attacks. Bacilluria, then, can exist in leprosy but is irregular, and so far as is yet known only after the administration of arseno-benzol or in tubercular cases either with ulcerative lesions or during an acute attack.

J. H. S.

MERIAN (Louis).—**Positiver Leprabazillenbefund in den Fäzes bei an Leprösen Schleimhautveränderungen des Kehlkopfes leidenden Patienten.** [Lepra-Bacilli in the Faeces in Cases of Leprosy of the Laryngeal Mucosa.]—*Dermatologische Wochenschr.* 1913. Mar. 8. Vol. 56. No. 10. pp. 269-271.

The author examined the faeces of 3 cases of lepra tuberosa, of which one showed very advanced lesions in the nose and larynx, the second some congestion of the nasal mucous membrane and false vocal chords with some whitish nodules, and the third had no apparent lesions in this region. In the stools of the last he found no lepra-bacilli at any time; in the first he found a considerable and in the second a still larger number. The large number present in this second case was surprising, and Merian attributes it to the influence of potassium iodide which had recently been given in large doses. The bacilli did in fact disappear from later stools, of which he examined six in each case.

J. H. S.

ANIMAL INOCULATION EXPERIMENTS.

STANZIALE (Rodolfo).—**Nouvelles Recherches sur les Inoculations de Matériel Lépreux dans la Chambre antérieure de l'Oeil des Lapins. iiie Communication.**—*Lepra.* 1912. Nov. Vol. 13. No. 2. pp. 87-105. With 7 plates.

Stanziale has injected lepra bacilli into the anterior chamber of the eye in 31 rabbits. Into 12 of these the material injected was fluid and consisted of the juice of lepromata obtained by aspiration or of juice obtained by extracting fragments of leprous tubercles in salt solution. In none of these 12 did any multiplication or growth occur, although the fluid injected was rich in lepra bacilli. Into the remaining 19 pieces of leproma tissue were injected, and in eight of these a positive result was obtained. The conditions essential for success are difficult to determine, but apparently the chances are increased if the portion injected is of some size, and also if it is quite fresh, although positive results were obtained with tissue injected 19 hours after its removal from the patient. The tissue-fragment injected at first increases in size owing to imbibition of fluid and exsudative reaction around it; but after a time begins to diminish again. This regressive change goes on to nearly complete absorption in negative experiments. In the positive cases, however, it is checked some 30-60 days after the inoculation, and the fragment again increases in size, until in 3-4 months it may be 7-8 times as large as at first, and of a grey or reddish tint. At the same time small nodules or points develop on this mass or on the parts in the immediate neighbourhood. The vessels of the iris undergo a development in the early stages, but this subsides in time, and brick-red infiltrations of the iris appear, which gradually coalesce and constitute new formations, lying, it may be, some distance from the original mass. These are genuine granulomata and contain many acid-fast lepra-bacilli, which the author considers are certainly due to local multiplication. Similar nodules may develop in the cornea, should the original mass as it increases in size come to touch its posterior surface. Rabbits in which positive growth has been obtained give a positive Wassermann reaction. In view of the differences of opinion regarding the Wassermann reaction in rabbits this point is not insisted upon, but Stanziale has never seen a positive reaction in normal rabbits nor in animals inoculated in the anterior chamber with pieces of normal skin or with lepromata sterilised by heat.

A commission was appointed by the Royal Academy of Medicine and Surgery of Naples to examine Stanziale's specimens and data and in its report, which is appended to the paper, it is stated that there can be no doubt that multiplication of the bacilli had taken place and that he had produced small tumours of granulomatous structure, rich in bacilli, in both cornea and iris.

J. H. S.

ORGANISMS CULTIVATED FROM LEPROUS LESIONS.

KRITSCHEWSKY (J.) & BIERGER (O.). **Zur Frage über das Verhältnis des *Bacillus leprae* Hansen zu einigen bei Lepra gezüchteten Mikroorganismen.** [On the Relationship of certain Organisms cultivated from Leprous Cases to the *B. leprae* of Hansen.]—*Zeits. f. Hyg. u. Infektionskrank.* 1913. Vol. 73. No. 3. pp. 509-547.

The writers, who are assistants to KEDROWSKY, have tested the complement-binding power of leper sera when combined with extracts made from Kedrowsky's lepra culture, Duval's organism, *B. tuberculosis*, *B. typhosus* and one of the acid-fast butter-bacilli, Korn I. They used 28 sera and note that their power of spontaneously deviating complement did not increase, even on prolonged keeping. Of these sera 13 were from cases of lepra tuberosa, 7 of lepra mixta and 8 of lepra nervorum. The extracts were made by LEUCH's method, and the authors insist that the

results noted in the literature as having been obtained with ether or alcoholic extracts must be rejected, since deviation with such extracts may not be specific. The extracts they made from *B. typhosus* did not bind complement with any of the 11 sera they tried, and the extracts of the butter-bacillus gave binding only occasional and always very slight, which they attribute to a possible group reaction.

With Kedrowsky culture all but one of the tuberosa sera gave strong complement-binding. So also did all of the sera from lepra mixta, and 5 of the 8 lepra nervorum sera. In the nervous cases, however, a considerably higher dose of serum was necessary to obtain a strong reaction, and possibly if sufficient serum had been available for the experiments, the three negative sera would have proved positive with the higher quantities. In 2 of the lepra mixta sera the reaction was less pronounced than with the others, and these cases were clinically close to the nervous type of the disease. The weak reaction in nervous cases is to be associated with the small number of bacilli present in the tissues in such cases and the smaller tissue reaction. After injection of lepromatous tissue into rabbits and a monkey (*Cercopithecus sabaeus*) the serum of these animals gave a positive fixation reaction with Kedrowsky extract. Special precautions were taken and controls carried out to ensure that the tissue injected contained no other organisms than Hansen's bacilli. In one patient, who was treated with a "leprin" made from Kedrowsky's culture on the lines of Old Tuberculin, the reaction became weaker after the treatment.

With Duval's culture on the other hand only 2 of the sera gave a strong positive reaction. In 7 cases a very slight or doubtful reaction was obtained, due perhaps to a group reaction. A special investigation with the sera of rabbits immunised to the two cultures showed that the relationship between them is not very close, much less so than that between Kedrowsky culture and *B. tuberculosis*. Extract of tubercle bacilli gave a positive reaction with 8 out of 11 sera tested, the results corresponding to the reactions with Kedrowsky extract; and tubercle extract reacted with the sera of rabbits immunised to Kedrowsky. A few agglutination experiments were done, and of 9 sera tried 4 agglutinated Kedrowsky culture feebly, 2 agglutinated *B. tuberculosis* very feebly, and none affected Duval culture.

J. H. S.

SMITH (Allen J.) & RIVAS (D.).—**The Culture and Biological Characteristics of Lepra Bacillus.**—*New Orleans Med. & Surg. Jl.* 1912. Oct. Vol. 65. No. 4. pp. 265-273.

The authors obtained from DUVAL an organism isolated from a leper nodule, which they examined in some detail. It was one of the chromogenic bacilli growing on gelatin, described by that author. Smith and Rivas used a medium consisting of white of egg that had been exposed to the action of trypsin, and also a peptone solution similarly trypsinised, and found both media very satisfactory for the growth of this organism. The authors also state that they obtained from at least two cases of leprosy a growth of acid-fast organisms. The material used to inoculate their (trypsinised) medium was blood from a nodule, blood from the finger or toe, and in at least one case "venous blood." Growth resulted in all cases, but the acid-fast organisms were not obtained in pure culture. In the blood from the toe they found not only acid-fast bacilli grouped in the manner of *B. leprae*, but also lepra cells filled with acid-fast bacilli, the organisms being present both in endothelial cells and lymphocytes. They look upon this as definite evidence that bacteriaemia exists in leprosy. [It is not always possible to follow exactly what the authors did or mean, but apparently their organisms were never obtained in pure culture, and whether they correspond to one another or to the organism of Duval is not indicated.]

J. H. S.

CURRIE (Donald H.), CLEGG (Moses T.), & HOLLMANN (H. T.). **Cultivation of the Bacillus of Leprosy.**—*Lepra.* 1912. Nov. Vol. 13. No. 2. pp. 71-86.

Up to the present time the authors of this paper, either independently or in association with one another or with BRINCKERHOFF, have succeeded in growing acid-fast bacilli in symbiosis with cholera and amoebae at least 16 times from 15 cases of leprosy, and have isolated these bacilli in pure culture 7 times. A detailed description of the cultural characters of six of these pure cultures is given in the present paper. With trifling exceptions they agree with one another, and the six cultures may be regarded as different strains of one organism. They also give for comparison a similarly detailed account of the cultural characters of *B. margarin*, *B. smegmae* and one of MOELLER's grass bacilli, and these three organisms correspond very closely to the "lepra" cultures—so closely that it is doubtful whether the differences that do exist are sufficiently definite or constant to justify a distinction. *B. margarin* in particular resembles the "lepra" strains exceedingly closely. The serum of a horse, however, that had been immunised to 4 of the lepra strains, agglutinated all the lepra organisms, but none of the three other acid-fast bacilli, which can therefore be distinguished from the lepra organisms. The authors recognise that the only evidence they have so far produced of their "lepra" bacilli being the cause of leprosy lies in the frequency with which they have been able to isolate it from cases of the disease, its acidfastness and morphology, and in this serological evidence that it is not one of the common saprophytes. [It seems a pity therefore that they should insist on calling the organism *B. leprae* in the meantime, an unwarranted use of the term which only adds to the confusion already sufficiently great in this subject.] A summary of previous attempts to isolate and grow the bacillus of HANSEN is given.

J. H. S.

Bayon (H.). **The Bacteriology of Leprosy.**—*Jl. London School of Trop. Med.* 1912. Dec. Vol. 2. Part I. pp. 65-73.

A statement of the present position of this controversy from the point of view of the writer, which has already been more than once brought before the readers of this *Bulletin*. No additional facts are given.

J. H. S.

Bayon (H.). **Ein neuer Nährboden für die Kultur und Isolierung von parasitischen oder schwach saprophytischen Bakterien. Eine Bemerkung zu der Arbeit von Creighton Wellman.** [A New Medium for the Isolation and Cultivation of Parasitic or Feebly Saprophytic Bacteria. A Note on the Paper of Creighton Wellman.]—*Centralbl. für Bakt.* 1. Abt., Orig. 1913. Jan. 23. Vol. 67. No. 7. pp. 591-592.

Bayon points out that the placental-extract medium, recommended by Creighton Wellman for the growth of *B. leprae*, had been described by Kedrowsky in 1901, who also used it for the isolation of Mycobacterium tuberculosis. The organism which Creighton Wellman names *B. leprae* is in Bayon's opinion an ordinary chromogenic saprophyte of the type of Moeller's Mistbacillus, having nothing to do with leprosy.

J. H. S.

Machow (D.). **Zur Frage über Kedrowski's "Leprakultur."** [On Kedrowski's Lepra-Bacillus.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1913. Jan. 11. Vol. 67. No. 6. pp. 434-446.

An account of an examination of the organism isolated by Kedrowski from lepers, by cultural methods and animal experiment. Machow confirms the statements that it presents marked differences in form according to the medium on which it is grown, and shows that it can by careful training be made to grow on ordinary media. Its acid-fast character may be lost in the course of this procedure, but is regained on injection into animals. For white mice it is apparently pathogenic, more so than for rabbits, and produces lesions which have not much resemblance to tuberculosis and are suggestive of leprosy. The organism may be included in the same group as the tubercle bacillus, but does not present a close similarity to the latter. Machow is of opinion that the organism cannot be rejected on the grounds advanced by some authors and that further investigation is to be desired.

J. H. S.

Kraus (R.), Hofer (G.), & Ishiwara. **Ueber Differenzierung von Leprabazillen mittels Bakteriolyse. (Zur Frage der Bakteriolyse säurefester Bakterien.) 3. Mitteilung.** [The Differentiation of Lepra Bacilli by means of Bacteriolysis.]—*Wiener Klin. Wochenschr.* 1913. Feb. 27. Vol. 26. No. 9. pp. 319-321.

In previous papers the authors showed that tubercle and some other acid-fast bacilli underwent an intense bacteriolysis in the peritoneal cavity of infected guineapigs, and that the serum of such animals could produce a similar action in the peritoneal cavity of normal guineapigs. They now state that the two strains of organisms known as Duval's and Kedrowski's, for both of which the name of *B. leprae* has been claimed, are like the other acidfast bacilli in this respect. In both cases the serum of immunised or injected guineapigs produced lysis of the corresponding organism in normal guineapigs and lysis occurred in the peritoneum of animals injected with the living organism previously. Duval serum, however, had no effect on Kedrowski bacilli, nor Kedrowski serum on Duval bacilli; and no lysis occurred of the one kind when introduced into the peritoneum of an animal previously injected with the other kind. As the injection of living lepra-bacilli of either kind does not produce any infection, local or general, in rabbits or guineapigs, the authors conclude that it is not necessary for the production of lytic substances that a lesion should be produced in the injected animals, such as has been considered essential for other antibodies in the case of tubercle. By this method they can separate the two cultures from one another as can be done by the ordinary cultural means, but they point out that it is not yet decided that either is the cause of leprosy, and Kraus failed to get a reaction in actual cases of the disease.

J. H. S.

In the *Bulletin de la Société de Pathologie Exotique*, 1912, Dec., Vol. 5, No. 10, p. 774, it is announced that a Commission, consisting of MM. Borrel, Jeanselme, Marchoux and Pinoy, has been appointed by the Society to make a comparative study of the numerous organisms which are alleged by different observers to be the causal agent of leprosy.

J. H. S.

RAT LEPROSY.

Ishiwara (T.). **Ueber die Rattenlepra.**—*Centralbl. f. Bakt.* 1. Abt., Orig. 1913. Jan. 11. Vol. 67. No. 6. pp. 446-450.

The author had occasion to examine in Korea 7,001 rats of various species, viz., *M. decumanus, rattus, alexandrinus, indicus* and *Apodenus minutus japonicus*. The relative numbers of these kinds, of which he gives a short description, were 34·2 per cent.; 24·8 per cent.; 24·0 per cent; 13·0 per cent.; and 3·6 per cent. respectively. Five animals presented macroscopic appearances resembling leprosy, but only in two, both *decumanus*, were acid-fast bacilli found.

J. H. S.

Marchoux (E.) & Sorel (F.). **Le Lepra des Rats** (*Lepra murium*). —*Lepra.* 1913. Jan. Vol. 13. No. 3. pp. 171-206.

Although the fact is not stated, this is the same paper as that published in the *Annales de l'Institut Pasteur,* and already summarised in this *Bulletin* (No. 4, p. 202).

J. H. S.

UNCLASSED.

SUGAI (T.) & MONOBE (J.). **Ueber histologische Befunde in der Placenta Tuberkulose-und Leprakranker.** [Histological Observations on the Placenta in Cases of Tubercle and Leprosy.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1912. Dec. 11. Vol. 67. No. 4. p. 232.

Seven cases of tuberous leprosy and four of the nervous form were examined, and seven cases of tuberculosis. As well as in other parts of the placental tissue lepra bacilli were observed in the hyalin areas and sometimes in considerable numbers, but in this locality tubercle bacilli were not met with. The authors look on the hyalin material or fibrin as a regressive substance derived from blood-clot, and suggest that the presence of lepra bacilli in it, where tubercle bacilli are not found, indicates that the former are anaerobes.

J. H. S.

SUGAI (T.). **Ueber die viscerale Lepra.** [Leprosy in the Viscera.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1912. Dec. 11. Vol. 67. No. 4. pp. 230-231.

An abbreviated account of the distribution of the bacilli and other pathological changes in the organs, based on the postmortem examination of 11 male and 2 female lepers. Special attention was directed to the reproductive system.

J. H. S.

PRINGAULT (E.). **Contribution à l'Etude Hématologique de la Lèpre.**—*Arch. de l'Inst. Pasteur Tunis.* 1912. No. 4. pp. 228-232.

Blood counts in 4 cases of lepra tuberosa. All showed some diminution in the number of red cells, which vary from 3,546,000 to 4,187,000, with a low colour index, numerous hematoblasts and a marked irregularity in size of the cells. The white cells are also reduced in number (6,500-8,020), with presence of myelocytes in all the cases (up to 3·1 per cent.), relative polymorphonuclear leucocytosis in 3 of them, and a slight eosinophilia (4·18 per cent.) in one. The neutrophil polymorphonuclear cells arranged according to the scheme of ARNETH show a preponderance of those with 3 nuclei, and the nuclear index is higher than normal.

J. H. S.

PALDROCK (A.). **Untersuchung der Jakutenspeise auf Leprabacillen.** [Examination of the Food of the Yakoots for Lepra-Bacilli.]—*Sitzungsberichte der Naturforscher-Gesellschaft bei der Universität Jurjew.* [Dorpat.] 1912.

It is a current local belief that the Yakoots (inhabitants of Eastern Siberia) contract leprosy from eating diseased or rotten fish, and one at least of the practitioners resident in this region is convinced that the spread of leprosy is directly due to the eating of "Soma." This article of diet consists of small fish which are thrown into ditches or troughs and, some milk having been poured over them, are then left to ferment until the arrival of the first frosts converts the mixture into a solid block. During the winter the Yakoot chops from the frozen mass the desired amount and cooks it with milk or beer, the final product having an odour so powerful that even horses can scarcely be got to approach the houses at meal-time. There are two or three other ways of preparing fish for eating, and Paldrock examined some 4 samples of such articles for the presence of leprosy bacilli but found none.

J. H. S.

BARBÉZIEUX (G.). **La Prophylaxie de la Lèpre en Indochine.**—*Bull. Soc. Méd.-Chirurg. de l'Indochine.* 1912. Nov. Vol. 3. No. 9. pp. 598-606; No. 10. pp. 643-653.

La Lutte contre la Lèpre au Tonkin.—*Ann. d'Hyg. et Méd. Colon.* 1912. Oct.-Nov.-Dec. Vol. 15. No. 4. pp. 751-760.

An account of the quite inadequate arrangements at present in force in Tonkin for the segregation and care of lepers, and a suggested scheme for establishing properly organised asylums with as little restraint and confinement of the inmates as possible.

J. H. S.

ROUX (M.). **Quelques Réflexions sur la Lèpre à propos du Rapport de M. le Docteur Barbézieux.**—*Bull. Soc. Méd.-Chirurg. de l'Indochine.* 1913. Feb. Vol. 4. No. 2. pp. 64-69.

Leprosy as it exists in our time is not a disease with pronounced tendency to diffusion or to violent epidemic explosions, and M. Roux considers that elaborate schemes for the segregation of those infected with this disease are largely misdirected efforts, which might be more usefully employed in the study of its treatment and the discovery of a cure.

J. H. S.

SUDHOFF (Karl). **Dokumante zur Ausübung der Lepraschau in Frankfurt a. Main im XV. Jahrhundert.** [Documents relating to the inspection of Leprosy in Frankfort in the 15th century.]—*Lepra.* 1913. Jan. Vol. 13. No. 3. pp. 141-170.

In the Middle Ages there existed on the Continent of Europe a number of local centres, such as Vienna, Köln, Strasburg, where a pronouncement recognised as authoritative could be obtained on the presence of leprosy in any suspected case, and we have here an interesting collection of official letters and documents of the second half of the 15th century illustrating the system in use at Frankfurt at that time.

J. H. S.

ZAMBACO. **La Lèpre dans l'Antique Egypte.**—*Presse Médicale d'Egypte.* 1913. Feb. 15. Vol. 5. No. 4. pp. 57-59.

Leprosy was well known in Egypt before the exodus of the Hebrews. It appears to have been derived from India, its ultimate cradle being central Asia, and was spread widely by the Phoenicians, among whom it was so common that morbus Phenicius signifies leprosy. No doubt many other cutaneous diseases were confused with it, and probably the disease from which Asariah suffered was syphilis, but it is believed on anatomical grounds that Ptolemy II. (285-247 B.C.) was infected with leprosy.

J. H. S.

UNDULANT FEVER.

CARRIEU (M.) & ANGLADA (J.). **Comment peut-on rendre moins Incertaine la Valeur Diagnostique de la Séro-réaction d'Agglutinement du** *Micrococcus Melitensis?*—*Presse Médicale.* 1912. Nov. 2. No. 90. pp. 909-911.

The authors describe the difficulties and the contradictory results of workers in this branch of scientific diagnosis. They show how certain cultures give reactions with normal serums, and state their belief that the test has been much over-estimated. What is the cause of this non-specific agglutination? Is it a spontaneous agglutination of non-motile bodies, does it depend on the age of the culture, the presence of an alexin, or the action of the leucocytes? The false agglutinations are most commonly obtained when using febrile serums and in dilutions up to 1/80. They criticise NÉGRE and RAYNAUD for using the microscopic method; they prefer the macroscopic.

The rest of the paper is divided into three parts. The first deals with results obtained when varying dilutions are used, the works of WEILL and MENARD, SAISSAWA, GARDON, ROUSLACROIX, DANLOS and others being quoted. The consensus of opinion is that high dilutions are necessary for accurate results. The authors fix the minimum at 1/200, higher dilutions being even better. In the second part the varying agglutinating powers of different strains are considered, especially with regard to non-specific serums. With these the reactions may occur at from 1/10 to 1/200, whereas with specific serums the variations are very slight; that is to say, the irregularities found with non-specific serums disappear almost entirely when specific serums are used; they think therefore that for diagnosis every serum should be tested with many strains before a positive opinion is formed.

In the third part NÉGRE and RAYNAUD's method of heating the serum to 56° C. for half an hour is criticised, a method which according to these observers cuts out all non-specific reactions, leaving intact the specific. With the authors this was not always the case, but they believe that the method has a very high diagnostic value.

Finally, they state that agglutination in the case of *M. melitensis* is inferior in diagnostic value to that for *B. typhosus* and is less certain than haemo-culture or fixation of complement; but to render it less uncertain they propose a triple verification: by (1) the employment of high dilutions of the serum; (2) testing the serum with many strains; (3) heating the serum. The exclusive application of any one method they believe to be insufficient.

[If a minimum dilution of 1/200 is used, a large number of subacute undulant fever cases will be missed; with the use of a 1/50 dilution, and an emulsion made from a 48 hour growth of well attested agar cultures errors in results have been, in the writer's experience, very few.]

P. W. Bassett-Smith.

VALLET & RIMBAUD (L.). **Étude Expérimentale de l'Agglutination du *Micrococcus melitensis*.**—*Compt. Rend. Soc. Biol.* 1913. Feb. 21. Vol. 74. No. 7. pp. 323-324.

A resumé is given of some experimental work with the *M. melitensis*, relating to agglutination reactions obtained by using different methods, several laboratory animals, and four strains.

(i) It was found that with healthy guinea-pig serum agglutination was not obtained in higher dilutions than 1/20. In rabbits it often rose to 1/50; of 21 healthy dogs 18 reacted, once in 1/20, five times in 1/100, seven times in 1/200, once with 1/300 and four times with 1/400; one strain was twice agglutinated at 1/600. Heating the serum at 56° C. always prevented these reactions and the addition of fresh serum did not restore the agglutinating power.

(ii) Immunising the different animals with *B. typhosus*, *B. coli com.*, *Staphylococcus*, etc. did not cause any modification of the agglutination reaction.

(iii) Intravenous injections of cultures of *M. melitensis*, killed by heating to 60°, into rabbits produced highly agglutinating serum, up to 1/3000; subcutaneous injections were less effective. Heating these serums to 56° C. caused the specific agglutinins to disappear in many of the animals, and reduced the activity in the remainder from 1/3000 to 1/200.

(iv) The agglutinability of different races of the *M. melitensis* with normal serums was very variable; certain serums agglutinated one strain in dilution of 1/400, without causing any reaction of the other three. The serum of an animal immunised by one strain generally agglutinated the other strains, but not always. The highest agglutination reaction was not necessarily obtained with the strain which had been used to immunise the animal. When the heating did not destroy the specific agglutinating power, the amount of agglutinability of the different strains, before and after heating, was not proportional.

P. W. B.-S.

RONCHÈSE (A.). **Sur le Séro-Diagnostic de la Mélitococcie avec des Cultures tuées par le Formol.**—*Compt. Rend. Soc. Biol.* 1913. Feb. 7. Vol. 74. No. 5. pp. 210-212.

Two cases of infection with the *M. melitensis* having recently occurred in his laboratory, WIDAL caused emulsions killed by formalin to be used. A series of experiments was carried out by the author to show if such emulsions would give as good results as the living emulsion. His results are interesting. Emulsions from cultures three days old were made and two drops of formalin were added to every 15 c.c. Tests were made by the microscopic method, with unheated serum in dilution of 1/10, 1/50, 1/100, and 1/200 using living emulsion, killed emulsion two months old, and the same one year old. All gave positive reactions up to 1/100 and none with 1/200, but curiously the rapidity of the action was greatest in the one-year-old killed emulsion, and slowest in the living. Tests were made to see if this rapid agglutinability would not render the reaction less specific. During the year a number of febrile conditions (30) were examined with the method; the results were all negative with a time limit of two hours. When heated serums were used, as recommended by NÉGRE and RAYNAUD, the results were similar as to dilutions, but the time taken was rather longer than with unheated serum. The author concludes that the advantages of using emulsions killed by formalin are very considerable, and that these emulsions retain their properties for at least a year and probably longer.

P. W. B.-S.

BASSETT-SMITH (P. W.). **The Diagnosis and Treatment of Undulant or Mediterranean Fever.**—*Jl. of Hygiene.* 1912. Dec. Vol. 12. No. 4. pp. 497-505. With 2 charts and 1 plate.

Attention is drawn to the great reduction of this fever since the prophylactic measures recommended by the Commission of the Royal Society have been in force, and to the gradual extension of the disease into areas away from the sea, in France, Spain, etc. A short review is given of some of the recent work, in which agglutination methods have furnished very varying results. A series of tests was made with five separate strains of *M. melitensis*; three undulant fever bloods and 65 controls were used, and the emulsion in normal saline was made from a 48 hour old agar culture. Dilutions of 1/40, 1/100, 1/400, of both heated and unheated serums, were put up and the sedimentation method was used throughout. The tubes were placed in the 37° C. incubator for 48 hours, then read off, and again in 12 hours' time.

All three undulant fever serums reacted in high dilutions with all five strains; of the controls only in one was there a positive reaction and this was with the heated blood at 1/100; the percentage of error was therefore very low. In some chronic cases agglutination responses may not be given; therefore other methods must be used, which are mentioned. A series of complement fixation experiments was carried out, by a technique which is given; the number examined was small but the reaction was specific (25 cases). Attention is also drawn to the variability of the morphology of the organism, and the occurrence of streptococcic forms. Treatment by yeast and vaccines is recommended, and a chart is given of a case in which, apparently, the benefit from this method was very marked.

P. W. B.-S.

SCORDO (Francesco). **Experimentelle Studien über die Therapie des Mittelmeerfiebers.** [Experimental Treatment of Mediterranean Fever.]—*Centralbl. f. Bakt.* 1 Abt., Orig. 1912. Dec. 4. Vol. 67. No. 3. pp. 151-164.

The author describes his investigations of experimental undulant fever carried out in the Institute of the University at Rome, under Prof. BACELLI, in the tropical section under Prof. GABBI.

Three goats were infected by intravenous injections of *M. melitensis*, and after the infection had been proved to have been established by means of agglutination and blood culture tests, they were treated with intravenous injections of $HgCl_2$, the effects on the blood being carefully observed; these are shown in tabular form.

A resumé of the treatment by corrosive sublimate of other diseases is given (puerperal fever, scarlet fever, acute rheumatism, etc.). The goats were taken from the neighbourhood of Rome and were found to be as susceptible to the disease as Maltese goats. The author describes the care with which the animals were housed and kept, and how the blood of each was repeatedly examined before treatment; they proved to be free from disease. Each goat received 2 or 3 injections of the specific organism in a vein of the ear at intervals of 5 to 8 days. These caused a rise in the temperature, and definite serum reactions; the organism was also isolated from the blood. The formula for the sublimate injection (BACELLI'S) was—

$Hg\,Cl_2$	1-2 gm.
$Na\,Cl$	8 gm.
H_2O	1000 c.c.

dose 1 to 10 c.c. injected intravenously every 3rd to 8th day.

The author notes the effect of the therapeutic injections on the temperature, milk, and blood in each case. The post mortems showed very few pathological appearances, slight splenic enlargement, some hyperaemia of the intestine, and enlargement of the mesenteric glands. He states that the injections have no harmful effect on the agglutinating elements, nor in all probability on the group of antibodies in the blood. He draws the following conclusions.—(1) The intravenous sublimate injections act chiefly on the blood corpuscles, increasing their number. (2) They cause an increase in the haemoglobin. (3) They produce a leucocytosis with an increase in the polynuclear cells. (4) They attack energetically the specific micro-organism, causing it to disappear from the blood and arresting further development of the fever.

The same method of treatment is now to be employed on man, and the results will be published.

[A germicidal preparation which will at the same time increase the number of the polynuclear leucocytes has long been sought as the most probable means of cure of undulant fever. These admirably carried out experiments are therefore of great value, but three cases are too few to draw definite conclusions from.]

P. W. B.-S.

BASSETT-SMITH (P. W.). **A Case of Para-melitensis Fever.**—*Jl. of Trop. Med. & Hyg.* 1913. Feb. Vol. 16. No. 4. pp. 50-51.

The work of NÉGRE and RAYNAUD is referred to, which demonstrated the occurrence of an organism called the *Micrococcus para-melitensis*, differing only in its biological characters from the *M. melitensis* (*see* this *Bulletin*, No. 2, p. 76). The case is described of a patient who contracted, at Hyères in the Riviera, an irregular fever associated with joint pains, neuritis, constipation, sweats, and loss of weight, in which the diagnosis lay between undulant fever and infective rheumatoid arthritis. A diagnosis of undulant fever was made from the clinical symptoms by several observers, but as it could not be confirmed, either by culture of the micro-organism from the blood or urine, by the agglutination reaction, or by the complement fixation method, no positive opinion could be given. After the disease had lasted two years, the blood was tested with *para-melitensis* organisms, received from NICOLLE, of Tunis, and was found to react in dilutions up to 1/400. At the same time it gave a negative reaction with five strains of *M. melitensis*. The reaction was confirmed by the use of the absorption method with the two organisms. This is the first case of this disease recorded, and the careful observations which have been made, extending over a long period of time, make it one of great interest.

P. W. B.-S.

LONGO (A.). **Contributo alla Conoscenza della Febbre di Malta nell' Etá Infantile.** [Contribution to Knowledge of Malta Fever in Infants.]—*Rivista Ospedaliera.* 1913. Jan. 15. Vol. 3. No. 1. pp. 3-14.

In a systematic examination of children attending his clinic at the university of Catania the author found five positive reactions to *M. melitensis* out of 100 cases. Two of these cases which were of special interest are reported. The first was an infant 7 months old with a month's history of fever; it was born of healthy parents and was partly suckled by the mother and partly fed on goats' milk; the latter is said to have been always boiled, but this was doubtful. The blood agglutinated strongly at 1/1000 and partially at 1/1500. The most noticeable feature of the case was the occurrence of tremors of the left side, lasting on and off for 10 days, apparently due to meningeal irritation.

The second case, an infant 28 months old, was more severely ill and the blood agglutinated also up to 1/1000. This case was remarkable for the association of cystitis, coming on spontaneously, and convulsive attacks, probably also meningeal in origin, from which the child died. There could be no doubt as to the diagnosis; the culture of *M. melitensis* had been lately isolated by ZAMMIT, and the serum reacted in high dilutions.

It is very rare to get infection of children under one year old; it is said to occur most commonly between 12 months and 3 years. TOMASELLI believes that suckling infants have a certain amount of immunity, and calls the type of undulant fever in infants "Febbre Sudorale." In the two cases quoted the nervous and urinary systems were markedly affected. Meningeal symptoms have been mentioned in children by CANTALOUBE and HAUSHALTER. The blood of Case 1 was carefully examined; it showed a moderate reduction in number of the red cells, an irregular leucopaenia 6000-3000 per c.mm., and a relative increase of mononuclears.

The blood picture then does not differ from that of adults, but CANNATA's and LUNA's findings do not agree with this and further researches are required. It is noteworthy that the infant who recovered was fed entirely by the mother during the course of the disease.

[Observations by EYRE and others have shown that the mother's milk at times contains the specific organism, and may thus infect the sucklings.]

P. W. B.-S.

SUAREZ DE FIGUEROA (José). **Co-operacion al Estudio de la Fiebre de Malta.** [Co-operation in the Study of Malta Fever.]—*El Siglo Medico.* 1913. Jan. 11. Vol. 60. No. 3083. pp. 22-23; and Mar. 8. No. 3091. pp. 151-152.

The author draws attention to the fact that very little has been done in Spain towards the recognition or study of undulant fever. RAMON Y CAJAL, DURÁN, and FLORES ESTRADA have each written describing the disease, but undoubtedly the occurrence of this fever is often overlooked in Spain through practitioners not being familiar with the symptoms, and the absence of laboratory assistance for diagnosis.

In Barcelona the disease is common and is often called "Barcelona fever," a term however which may include many other conditions; cases occur throughout the province, both in the coast towns and in the interior, at Villanova, San Felicé, Castelltersol, Rubi, San Pedro and San Juliá. FLORES ESTRADA has described a case from a town in Toledo, in the very centre of Spain. The author on a visit to Bitem in 1908 found seven cases of undulant fever in a population of 500. Cases have also been reported from the province of Gerona to the north of Barcelona and from Tortosa in the province of Tarragona in the south, and others in the district at the mouth of the Ebro.

The disease appears to be widely distributed throughout Spain; it is therefore very important that Spanish medical men should become better acquainted with the symptoms and methods used for diagnosis, to prevent the errors which are at present frequently made.

In his further remarks on the same subject the author suggests the propriety of substituting a single universally recognised name for Malta fever, for the various trivial ones under which this disease is known at different points on the Mediterranean littoral. He is of opinion that this would be very desirable both for statistical purposes and for the methodical recognition of the complaint. The point seems one that might well be taken up at one of the International Medical Congresses. As regards the clinical recognition of the disease, the author draws attention to the method of differentiation by the characters of the pulse proposed by L. MORPURGO (*Sociedad de Ciencias Médicas*, 1909), which runs as follows:—

Malaria.—Patient with a morning temperature of 36·5° C. and a pulse of 72; in the evening, temperature 39·5° C. and pulse 96.

Enteric.—Morning temperature 38° and a pulse of 84; mid-day temperature 38° and pulse 80; evening temperature 39° and pulse 96.

Malta fever.—Morning temperature 36·5° with a pulse of 100; evening temperature 39·5° and pulse 120 to 140.

From his own experience Suarez thinks that this distinction according to the pulse-rate, though it has some value, cannot be regarded by itself as final. The characters seen in the same case may vary at different periods of the illness.

[The term Undulant fever is now in general use.]

P. W. B.-S.

ERRATUM.

Bulletin No. 2 (Nov. 30, 1912), p. 75, line 14 from bottom, for "in a dilution of 1/10" read "in a dilution of 1/30."

HEAT STROKE.

Ogilvie (W. H.). **Sunstroke—A Heresy.**—*Jl. R. Army Med. Corps.* 1912. Oct. Vol. 19. No. 4. pp. 444-446.

The author suggests that there is no such thing as sunstroke: all cases of this kind are heatstroke. Heatstroke is generally due to non-radiation of the heat from the body, caused by insufficient evaporation from the skin, arising from an increase in the humidity of the air. He admits, however, that when evaporation and radiation from the skin barely suffice to maintain the body temperature below the dangerous point, exposure to the sun can precipitate heatstroke.

C. Birt.

Hiller (A.). **Die psychopathische Hitzschlagform und über sog. merkwürdige Fälle (Dritte Mitteilung).** [Heatstroke with Mental Symptoms. Third Communication.]—*Deut. Militärärzt Zeitschr.* 1912. Oct. 5. Vol. 41. No. 19. pp. 742-748.

9·5 per cent. of the 568 cases of heatstroke which occurred in the German Army between the years 1888 and 1900 were complicated with mental disorder. The psychic disturbance is probably of the same nature as the neurasthenic symptoms which sometimes follow accidents. The admissions for mental ailments, including neurasthenia and hysteria, in the German Army have gradually risen from 544 in 1896 to 1,839 in 1908. Should these mentally unstable soldiers suffer from heat stroke, psychic symptoms may be expected. There may be noted hallucinations, illusions, delusions of persecution, excitement, restlessness, and talkativeness. Suicidal tendencies are frequent. The prognosis is favourable.

It is necessary to make post mortem examinations on all supposed cases of heatstroke which end fatally, for in 8 out of 36 autopsies various chronicly diseased conditions of the organs were discovered.

C. B.

MISCELLANEOUS.

East Africa Protectorate. **Annual Report of the Medical Department for the Year 1911.**—49 pp. F'cap. 1912. London: H.M. Stationery Office.

In the mountainous zone, comprising the provinces of Ukamba and Naivasha, including the Uasin Gishu Plateau at an altitude varying up to 9,000 feet, the health of the European Officials was on the whole satisfactory. The greater proportion of cases of illness were due to malaria, the malignant tertian parasite being responsible; quartan infections were rarely found. In Fort Hall district during the wet season digestive and bronchial affections were frequent, and outbreaks of dysentery and diarrhœa occurred in some native villages, probably due to a state of semi-famine during a cold, wet, spell of weather. In Nyanza and Kenia malaria was specially prevalent. The disease is indigenous and frequent in both these provinces. In the latter the vast majority of fatalities occurred in men who had returned to their villages to die after having been employed on work at the coast. They had undoubtedly brought the infection with them and could not be seen early enough for the administration of quinine.

Trypanosomiasis.—The position of trypanosomiasis remains the same as noted in last year's Report. It is undoubtedly dying down into a state of quiescence and is strictly confined to the *Glossina palpalis* infected areas in Kavirondo. After ten years' observation no extension beyond its original limits has been noted.

Relapsing Fever.—The existence of endemic spirochaetosis in the Kenia Province has been established beyond doubt. A case was seen in a Kavirondo policeman.

Enteric Fever.—No cases were reported from the Kenia Province, but four cases occurred in Nyanza amongst the officers of the Marine Department.

Leprosy.—This disease occurred in both provinces.

Beriberi.—One case was noticed in a sailor of the Uganda Marine.

Plague.—Kisumu experienced its annual occurrence of plague. In the early part of the year it was noticed that an epidemic existed amongst the rats. On April 23rd the first human plague case was admitted to hospital. Altogether 64 cases occurred, with a mortality of 49, giving a death rate of 76·56 per cent. As in former years the disease originated in old Kisumu. Judged by the death rate it would appear as if the virulence of the disease was getting slightly less. Forty-five of the cases were of the bubonic type, and 19 pneumonic.

G. C. Low.

Gabbi (Umberto). **Tropical Diseases in Tripoli.**—*Jl. of Trop. Med. & Hyg.* 1913. March 1. Vol. 16. No. 5. pp. 68-69.

A list of tropical diseases met with by the author during a tour in Tripoli is given. Undulant fever, kala azar, relapsing fever,

malaria, and yaws were all seen, and in addition to these, skin diseases such as psoriasis tropica, ulcus tropicum, ulcus infantum, lichen tropicum, granuloma venereum, tinea alba, and tinea nigra circinata were frequent. Apparently the Arabs on the coast showed the same diseases as the inhabitants in the interior, and this is not to be wondered at because the races are similar and the climate almost the same.

G. C. L.

MAURITIUS. **Annual Report on the Medical and Health Department for 1911.** [DENMAN (R.), Director.]—10 pp. F'cap. 1912. Mauritius: Government Printing Office.

Malaria and Hypertrophy of the Spleen.—2,117 cases were treated in the hospitals with a death-rate of ·89 per cent. Splenic hypertrophy fell from 561 to 380, showing that malaria is on the decrease.

Dysentery.—566 cases with a mortality of 12·54 per cent. were reported, this showing a slight decrease in the number and death rate from the former year (1910).

Enteric Fever.—Fifty-three cases were treated in the various hospitals against 48 in 1910 and 77 in 1909. The death rate was 22·6 per cent. The total number of cases notified in the Colony, including the above, was 182 with a case-mortality of 18·1 per cent. The diagnosis in most, if not all, of these cases was verified by Widal's reaction.

Pneumonia.—1,186 deaths occurred from this disease alone. It was very prevalent among the estate coolies, especially towards the end of the year. As the disease took on a quasi-epidemic form, plague was suspected but careful examinations of the sputum showed an absence of plague bacilli and proved that the disease was ordinary pneumonia.

Beriberi.—Eleven cases with three deaths were treated during the year. Some cases of epidemic dropsy resembling beriberi were reported. These occurred in one family.

Leprosy.—156 people were treated for leprosy at the leprosy asylum St. Lazare. Of these 82 belonged to the general population and 74 were Indians. 36 were discharged and 25 died, leaving 95 in the asylum at the end of the year.

Plague.—124 cases were treated in the general hospitals and 36 in the lazarets, against 77 and 243 in 1910. The end of the 1910-11 outbreak was abrupt, 86 cases occurring in January 1911, 22 in February, 5 in March and 6 in April; the last case was declared on the 20th of that month. Two cases were reported in June and then one on the 27th August, but the 1911-12 outbreak was delayed really until the end of September, when isolated cases began to appear. Up to December 31st, only 51 more cases were reported, making the total for the twelve months 173; of these 131 died, giving a death rate of 75·7 per cent. A table shows the incidence and fatality of the disease in each year since its introduction in 1899.

Surra.—Fifty-one animals were reported to have died from surra during the year; the figures for the last four years are as follows:—

1907.	1908.	1909.	1910.	1911.
306	192	158	50	51

The reduction probably means that most of the susceptible animals are now immune to the disease.

G. C. L.

Moss (C. J. A.). **Disease in Madagascar.**—*Jl. of Trop. Med. & Hyg.* 1913. Jan. 15. Vol. 16. No. 2. pp. 17-23.

In this paper, in which are described the ordinary diseases present in Madagascar, the author states that in his experience elephantiasis is rare in the province of Imerina. He has frequently seen it attacking the vulva, less frequently the legs, and never the scrotum. On the east coast of the island it is described as fairly common. According to observations made at the French Hospital there is a very high incidence of filariasis amongst the general population. Of other tropical diseases malaria is endemic practically all over the island. Dysentery is common, especially on the coast, while other cosmopolitan maladies such as tubercle and syphilis are frequently met with. A brief synopsis of these is given.

Breinl (A.). **Report on Health and Disease in the Northern Territory.**—*Bull. of the Northern Territory.* 1912. July. No. 1. pp. 2-24.

The author states that an expedition to the Northern Territory of Australia in which he took part was, on account of the short time spent in the country, limited to a comparatively small area of this vast district, but the route enabled a large number of observations to be made.

The Northern Territory comprises about one-fifth of the Australian Continent. It supports at present a very scanty population, consisting of a small number of Europeans, of Chinese, of a few Japanese and other eastern races, and in addition of an aboriginal population, the number of which can only be roughly guessed and which has only been civilised to a very slight extent. The aborigines, roving hither and thither over hundreds of square miles, lead an apparently objectless existence. The Territory, therefore, offers peculiarities, especially from the medical point of view.

The question of the suitability of this part of Australia for a white population is a subject on which much may be written. In Breinl's opinion the subject covers such a vast field that it is necessary to approach it from a scientific standpoint. Careful and accurate physiological and pathological observations must be made over a series of years and to a less extent over a lifetime, to ascertain such effects on the white man's constitution as continuous action of the sun's rays, the effect of long continuous work out of doors in the sun, the lack of a true winter season, the influence of the continuous high temperature upon the blood and blood forming organs and the internal metabolism in general.

As regards tropical diseases, many of these exist in the Northern Territory.

Malaria. This disease is very prevalent, appearing in more or less severe epidemics, in certain years causing much debility and a heavy mortality. It is common amongst the blacks who have come in contact with, and have been employed by the whites. Most of the cases amongst the aborigines are of the same type as those occurring on the stations or at the settlements to which they belong. An anopheline, *Nyssorhynchus annulipes*, is in all probability the agent which distributes the parasites from one person to another. Numerous larvae and pupae were collected from water-holes and the adult insects were bred out and identified. KINOSHITA in Formosa has shown that this species can transmit the disease.

Ankylostomiasis. Infections with ankylostomes have only been observed in a few cases, three in 1908 and one in 1910. It was not possible to determine whether the infection was contracted locally or whether it was brought from other regions of the Commonwealth.

Filariasis. A few cases of this condition have been noticed.

Beriberi. Patients affected with beriberi have been seen now and again in small numbers; they are chiefly found among the crews of pearling boats.

Trachoma. Trachoma, which is so prevalent in Western Queensland and Western Australia, has also been seen in the Northern Territory.

Amongst the aborigines syphilis, ulcerative granuloma, yaws, and leprosy are met with. Yaws is reported as being especially prevalent amongst the children. In addition to these, diseases of unknown origin occur.

Breinl points out that it is necessary to keep in mind that the Northern Territory, as far as the introduction of new diseases is concerned, is the most vulnerable point of tropical Australia. It is only a short distance from the Dutch East Indies and from China, where diseases are prevalent which if once introduced might give rise to serious epidemics. In the event of a white population being imported there is little doubt that malaria will spread further and form a serious menace to the economic welfare of the country. Preventive measures, Breinl believes, should be adopted and carried out now in a thorough and scientific manner; if they are delayed until an increased population appears, the difficulty of eradicating the disease must necessarily be greatly increased.

The conclusions reached are as follows: —

Malarial fever, both the simple tertian and subtertian, is fairly widespread, the latter type being in all probability introduced from New Guinea by means of insufficiently treated parasite carriers. A species of mosquito, *Nyssorhynchus annulipes*, was found in nearly every locality visited and in all probability acts as the intermediary host of the malarial parasite in those regions. Measures and means to prevent the further spread of malaria must be taken in the near future; otherwise it may prove a serious menace for the successful populating of the area.

On the whole, the white population shows, at present, a comparative freedom from disease, if malaria be excepted. The reason for the slow and tardy increase of the population of the territory is not due to the prevalence of disease, but must be sought in other directions.

The aborigines on the whole seem to enjoy fairly good health, but more disease, as far as one can rely on information, prevails amongst the coastal tribes than amongst those living away from the coast. The diseases amongst these primitive inhabitants, some of which are of unknown origin and not studied up to the present date, require further elucidation as regards their etiology, spread, and epidemiological importance from the point of view of the settlement of the Territory.

G. C. L.

Whitmore (A.). On the Bacteriology of an Infective Disease Occurring in Rangoon.—*British Med. Jl.* 1912. Nov. 9. No. 2706. pp. 1306-1308.

A description of a disease resembling glanders is given. The symptoms were those of a septicaemia with gross lesions in many organs. The lungs were specially affected and the lesions there were like those commonly present in acute glanders. Culturally, however, the *Bacillus mallei* was absent, but a bacillus, about the size and shape of that organism, occurred in very large numbers in all the acute lesions. The cultural characteristics of the new germ are given as follows:—

1. Rapid and luxuriant growth upon ordinary peptone agar.
2. Wrinkling which occurs early in the growth upon glycerine agar.
3. Pellicle formation at the surface of broth cultures.
4. The appearances of gelatine stab cultures at the end of the third day, and after one week's growth.
5. The curious tangled masses of long filamentous bacilli found in cultures upon salted agar.
6. The active serpentine motility of the bacilli in young cultures, and its early disappearance as the cultures age.

Eyre, who examined cultures brought to London, stated that the lesions produced by the Rangoon bacillus were so like those produced by glanders, that, in showing the characteristics of Strauss's reaction in the guinea-pig, he found that it was immaterial whether he selected a guinea-pig infected with true glanders or one inoculated with the Rangoon bacillus.

G. C. L.

BOOK REVIEWS.

BLACKHAM (R. J.). **Aids to Tropical Hygiene.**—F'cap. 8vo. viii. + 192 pp. 1912. London: Baillière, Tindall & Cox. [Cloth 3*s*. net. Paper cover 2*s*. 6*d*. net.]

A useful little handbook containing chapters on the following:—Climate and Meteorology; Air and Ventilation; Water and Water-Supplies; Food and Feeding; Clothing; Sites, Soils, and Houses; Disposal of Refuse; Disposal of the Dead; Insects and Disease; Animal Parasites; Prevention of Malaria; Disinfectants and Disinfection. In addition there are two appendices, the first dealing with tropical diseases and measures for their prevention, the second giving the distinctive characters of the more important species of flies found in houses.

G. C. LOW.

HARSTON (G. Montagu). **The Care and Treatment of European Children in the Tropics.** Introduction by Sir Patrick MANSON.—Crown 8vo. xvi. + 232 pp. With 14 plain and 3 coloured plates. 1912. London: Baillière, Tindall & Co. [7*s*. 6*d*. net.]

The care of European children in the tropics is quite as difficult as, if not more so than that of their parents. The subject has received little attention, at least in books, up to the present time and there is certainly an opening for Dr. Harston's little work. It is very clearly written, the matter is good, and the details are treated in a practical and convincing manner. It is evident that the author has studied this branch of tropical medicine closely and his experience should be specially valuable to those who may be called upon to attend children in Hong Kong or other colonies. The work furnishes most interesting reading and can be thoroughly recommended to all.

G. C. L.

CLEMESHA (Wm. Wesley). **The Bacteriology of Surface Waters in the Tropics.**—Demy 8vo. vii. + 161 pp. 1912. Calcutta: Thacker, Spink & Co.; London: E. & F. N. Spon, Limited. [7*s*. 6*d*. net or 7 rs. 8 an.]

This subject is one of the greatest importance for the tropics, the conditions of which differ so much from those existing in colder climates such as England. The work is divided into twelve chapters with three appendices. After an introduction the bacteriology of the faeces of man and other animals is discussed, then the prevalence and significance of streptococci in waters, the prevalence and significance of a class of organisms which ferments glucose but not lactose in surface waters, the action of direct sunlight on the common faecal organisms, the effect of sunlight on large natural lakes, the results of analysis of the waters of lakes and rivers in India, the position of certain faecal organisms in nature, the application of the foregoing researches to water analysis, and lastly, the "coli" method is compared with the separate species method.

A large portion of the work was done at the King Institute of Madras; it was afterwards continued in the author's laboratory in Bengal for a period of about four years. The author draws attention to the help he has had from his assistants AIYAR and MUDALIYAR, the latter being responsible for many of the results reported in the book.

All workers in India and, for that matter, in the tropics generally must be thankful to Major Clemesha for his very valuable work, containing as it does so much interesting research and useful information. It should become a textbook for public health workers in India and in other tropical colonies.

G. C. L.

LANGERON (M.). **Précis de Microscopie. Technique—Expérimentation—Diagnostic.** Preface by Professor R. BLANCHARD.—Collection de Précis Médicaux. 8vo. xxiii. + 751 pp. With 270 text-figures. 1913. Paris: Masson et Cie. [10 fr.]

The work is divided into three parts. Part 1 deals with the microscope and its accessories, pages 1-227; part 2 with general methods, pages 231-463; part 3 with special methods, this again being subdivided into three sections—protozoa, metazoa and botanical technique, pages 467-721. Finally, there is a general bibliography with an index, the total length of the book with the latter reaching 751 pages. The subject is treated in great detail and everything that is required to be known about microscopes, stains, fixing agents, hardening methods, the cutting of sections, preserving fluids for museum specimens,—staining of amoebae, spirochaetes, sporozoa, infusoria, worms, and arthropods,—cytological technique, micro-chemistry and medico-legal microscopic technique will be found within its pages. The author is specially qualified to write such a work as he has acted as the *préparateur* to the *Faculté de Médecine de Paris* for ten years and is also "*Chef des Travaux*" of the *Institut de Médecine Coloniale.*

The book should prove indispensable for laboratories, whether of histology, zoology, botany or parasitology, and will save workers much time and labour in looking up details, which are often widely scattered throughout the literature. There are 270 figures in the text. The price is moderate and should therefore be well within the reach of all.

G. C. L.

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[Continued from Bulletin No. 6, pp. 321-355.]

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See also **Amoebiasis, Relapsing Fever,** and **Sleeping Sickness.**

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. I.] 1913. [No. 11.

RELAPSING FEVER.

Nuttall (George H. F.). The Herter Lectures. 1. Spirochaetosis. [Lecture delivered on the Herter Foundation, Johns Hopkins University, Baltimore, Maryland, U.S.A., 8 October 1912.] —*Parasitology.* 1913. Jan. Vol. 5. No. 4. pp. 262-274; also in *Bulletin of the Johns Hopkins Hospital.* 1913. Feb. Vol. 24. No. 264. pp. 33-39.

This article contains a short summary of the present state of our knowledge of the blood spirochaetes, together with an account of their mode of transmission and cultivation.

The paper should be read in its entirety by anyone desirous of a condensed account of this important group of parasites, but attention may be called to one or two original observations. Thus, referring to the extension of the relapsing fever of Tropical Africa, the author points out that the distribution of the intermediate host, *Ornithodorus moubata,* is far wider than that of the infection it carries, and there is every reason to fear that an extension of the fever will follow with time. This contention is supported by a letter from the Rev. John Roscoe, of Cambridge, who was a missionary in Uganda, where he lived for many years at Kampala in a native-built house having reed walls supported by the usual wooden pillars. To quote the words of this gentleman:

> "Some of the pillars were in rooms, not in the walls, and it was at the bases of two of these pillars in the room used as a dining-room that I noticed the ticks in the year 1896 or about that time. For several years I continued to live in the same house and suffered no harm from them. In more recent years, that is, about 1903 or 1904, both Europeans and natives have suffered from 'Tick Fever' (Spirillum) in houses which were built on either side of the site on which my old house stood. It has been affirmed that the ticks in these houses are the cause of the fever; I can only conclude that in previous years they were innocuous and that they have become nocuous since 1896."

Attention is called to the fact that the spirochaete is not specifically adapted to the tick nor the tick to the spirochaete, for a variety of arthropods are capable of transmitting the same spirochaete and also the same arthropod is often able to carry several varieties of spirochaetes. In view of the morphological similarity between the supposedly different species of spirochaetes

and their individual variations in virulence, we may well doubt if any of the "species" are valid. The various specific names given to the spirochaetes causing relapsing fever in man may be used merely for convenience to distinguish strains or races of different origin.

The author concludes with the following words:—

> "To sum up, then, we have represented in the blood-inhabiting spirochaetes of warm-blooded animals a group of micro-organisms which, under natural conditions, are mainly conveyed by blood-sucking ectoparasites within which they undergo a process of development and in which they are hereditarily transmitted. Spirochaetes are not specialized parasites. Infection may take place through the skin or mucous membrane to which the spirochaetes gain access by being deposited thereon in the arthropod's dejecta or by the infested individual scratching or rubbing himself with hands which have become contaminated with the contents of the vermin which they have crushed. The lesions produced by the bites of the arthropods and the excoriations inflicted upon the individual by himself greatly facilitate the entrance of the spirochaetes."

E. Hindle.

NICOLLE (Charles) & BLAIZOT (L.). **Etudes sur la Fièvre Récurrente. Nouveaux Points de l'Etude Expérimentale de la Fièvre Récurrente, du Nord de l'Afrique.**—*Arch. de l'Inst. Pasteur Tunis.* 1912. No. 4. pp. 201-212. With 7 charts.

In the present article the authors continue their study of the relapsing fever of North Africa, especially on the susceptibility of various monkeys and the rabbit. Throughout their experiments a Tripolitan virus was employed.

Hooded monkeys (*bonnets chinois*), when injected intraperitoneally with blood containing spirochaetes, showed parasites in the circulation the following day. After being present for three to four days the spirochaetes disappeared and in the majority of cases there was no relapse. When the virus was passed through rabbits and subsequently inoculated into monkeys, the latter, in three animals out of twenty, showed relapses seven to eight days after the first attack.

Macaques (*Macacus inuus*) were found to be very susceptible to this Tripolitan virus. When injected intraperitoneally with four cc. of heavily infected blood, they showed spirochaetes in the circulation the following day and the parasites remained in the peripheral blood in enormous numbers for about seven days, after which the animals usually died.

The immune serum of recovered monkeys was found to be very effective in preventing infection. Thus a *rhesus* was injected with five cc. of the blood of a monkey that had just recovered from an attack of spirochaetosis and had shown two relapses. Twenty days later the *rhesus* was inoculated with four cc. of very heavily infected blood, but although examined for some weeks the animal never showed any rise in temperature nor spirochaetes in its blood.

The authors also succeeded in infecting examples of *Ctenodactylus gondi,* a rodent that was found to be extremely resistant to spirochaetal infection.

Rabbits were readily infected by the intravenous injection of large quantities of infected blood, and the strain was passed through twelve rabbits in succession without showing any diminution in virulence. In all cases the parasites attained their maximum about the 48th hour after the inoculation and disappeared from the circulation during the next 24 hours. After passage through ten rabbits one of the authors was accidentally infected with this strain, and the course of the disease showed that the virulence for man was undiminished. As mentioned above, the virulence for the monkey was greatly increased.

In conclusion the authors again call attention to the difficulty of distinguishing the various races of human spirochaetes, especially those belonging to the *recurrentis* group. The three criteria are usually considered to be the receptivity of laboratory animals, cross immunity reactions and the agglutination test. The two former have been shown to be unreliable, and at present the latter is the only means of distinguishing the various species of spirochaetes.

E. H.

NICOLLE (Charles) & BLAIZOT (L.). **Courte Durée de l'Immunité dans la Fièvre Récurrente Expérimentale. Valeur nulle de l'Epreuve de l'Immunité croisée pour la Distinction des Spirochètes du Groupe** *Obermeieri.—Bull. Soc. Path. Exot.* 1913. Feb. Vol. 6. No. 2. pp. 107-110.

The authors again call attention to the uncertainity of distinguishing strains of spirochaetes by their 'crossed immunity' reactions. In the present article they show that monkeys that have recovered from an attack of relapsing fever (Tripolitan strain) may be reinfected with the same virus.

Thus seven monkeys that had recovered from an attack of relapsing fever were subsequently inoculated with the same strain of spirochaetes. Three of these monkeys were still immune against reinfection, although the intervals elapsing since the first attack were respectively nine, seven, and six and a half months. The four remaining monkeys, however, were easily reinfected and suffered from severe attacks of the fever, one of the animals succumbing to the infection. The intervals since recovery from the first attack were respectively eight and a half, seven and a half, less than six, and less than seven months.

The authors state that when the first infection is very intense, there is more chance of a durable immunity being conferred, but the conditions are very uncertain, and it is evident that the crossed immunity reaction is not a safe method of distinguishing the varieties of the *recurrentis* group of spirochaetes.

E. H.

ROSS (Philip H.). **Spirillosis.**—*Nairobi Laboratory Report for the Months July-December,* 1911. Vol. 2. Part 2. pp. 6-12. [1912. Nairobi: Printed by the Government Printer.]

It appears that human spirillosis is much more widely spread in British East Africa than had previously been supposed, or that the disease has recently become more disseminated. Additional cases are recorded by the author from Fort Hall, Mweru, and also one from Nairobi, but in the latter instance the patient was living in a shop that dealt in native foodstuffs and it is probable that ticks had been introduced with them. Two other rather doubtful cases are recorded from Marsabit and *O. moubata* has been found at various localities along the road from Marsabit to the northern Guasi Nyiro.

The author attempted to determine, by means of immunity reactions, whether the Kenia strain (from Fort Hall) of spirochaetes was the same as one from Uganda. Monkeys were inoculated with the respective strains, but usually they died and those few that recovered could all be reinfected by a second inoculation of the same strain of spirochaetes. As a result no conclusive results were obtained regarding the possible distinctness of the two strains.

The virulence of the strain of spirochaetes employed by the author has, if anything, been increased by passage through monkeys (Sykes' *Cercopithecus*). In spite of its virulence, however, recovery from an attack of the 'Kenia' spirochaete is not followed by any appreciable degree of active immunity.

The report is accompanied by tables showing the results of inoculation experiments with two strains of spirochaetes from East Africa and one from Uganda, respectively.

E. H.

Gleitsmann. **Beitrag zur Entwickelungsgeschichte der Spirochäten (Borrelien).** [The Life-history of Spirochaetes (Borrelia).]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1913. Feb. Vol. 68. No. 1. pp. 31-49. With 1 plate and 2 text-figures.

The author has studied two strains of fowl spirochaetes, one from the Sudan and the other from Brazil, with especial reference to the nature of the so-called 'intra-corpuscular bodies,' described by Balfour as constituting part of the life-cycle of the Sudanese fowl spirochaete. The immunity reactions of the two strains were compared and found to differ *in vitro*. Thus serum immune against the Sudan spirochaete arrested all motion in this strain of spirochaetes more rapidly than in the Brazilian strain and *vice versâ*. Nevertheless, a fowl which had acquired immunity against one strain was also immune against the other, and therefore the two must be very closely related.

The remainder of the paper deals with the nature of Balfour's bodies, and the author inclines to the belief that they are degeneration products produced by the toxins of the spirochaetes, though they may represent some independent infection. Particulars are given of the course of the infection in nine fowls and five chickens. Three of the fowls infected with the Sudan strain and one with the Brazilian strain showed chronic symptoms characterised by anaemia, diarrhoea, and the emission of a very foul odour. In no case, however, was the relapse associated with the presence of either spirochaetes or Balfour's bodies. When the parasites were numerous in the peripheral circulation, the blood-cells sometimes presented an appearance identical with that produced by an injection of some haemolytic poison, such as phenylhydrazine. Under these conditions the nuclei of the red cells underwent karyolysis and gave off deeply staining bodies into the cytoplasm. In addition the spirochaetes were observed to penetrate into the red cells without, however, undergoing any changes in them.

[The results of Gleitsmann's observations tend to confirm the view that BALFOUR's bodies do not represent any stage in the life cycle of the spirochaete. In some cases the author gives incorrect references: thus LUHS is spelt "LUSS," and the reference to HINDLE's paper is given as *Ann. Trop. Med. & Parasit,* instead of *Parasitology,* Vol. 4, No. 4.]

E. H.

EPIDEMIOLOGICAL.

MILLOUS. **Les Epidémies Fébriles non classées et la Fièvre Récurrente dans le Thanh-hoa en 1910, 1911, et 1912.**—*Bull. Soc. Méd.-Chirurg. de l'Indochine.* 1913. Jan. Vol. 4. No. 1. pp. 14-18.

In 1910 and 1911 during the spring and autumn months epidemics of relapsing fever occurred in various parts of the province of Thanh-hoa, Annam, especially in the north. These epidemics were remarkable for the high mortality, about 500 deaths being recorded by the native authorities.

Over 2000 blood films were examined without finding any spirochaetes, and repeated Widal's also gave negative results.

In March 1912, epidemics of relapsing fever broke out suddenly in various distinct parts of the province, and in the blood of the patients spirochaetes were found without any difficulty.

The affection was remarkable for its severity, four deaths out of five cases before the employment of salvarsan, and even with this drug, if the treatment was commenced too late, the patients often succumbed. In most cases the fever was of the typhobilious type (see this *Bulletin* No. 7, p. 385).

The author obtained very good results by the employment of intravenous and subcutaneous injections of salvarsan. Very small doses, not exceeding 0·15 gm., were invariably used. In five patients the drug was administered per rectum, but in no case had it any effect on the course of the disease. Thus one patient succumbed although he had absorbed 0·5 gm. of salvarsan per rectum, more than four times the curative dose administered intravenously. The intra-rectal method of administration, therefore, should not be employed. [Compare the results of MOUZELS and NGUYEN-XUAN-MAI, see this *Bulletin* No. 1, p. 35.]

In conclusion the author remarks on the small size of the spirochaetes causing this outbreak of relapsing fever. They were only nine to fifteen microns in length, with three to four spires, and were so excessively fine that it was very difficult to detect them except in very clean preparations.

The limitation of the fever to a number of relatively restricted and isolated regions, and its simultaneous appearance and disappearance in all parts of the province is very remarkable. The possibility of the existence of reservoirs of the virus is supported by MILLOUS' observation, contained in a postscript to the article, that the examination of the blood of 600 persons in one of the districts that had recovered from an epidemic, revealed the presence of two isolated cases of the fever.

E. H.

DSCHUNKOWSKY (E.). **Das Rückfallfieber in Persien.** [Relapsing Fever in Persia.]—*Deut. Med. Wochenschr.* 1913. Feb. 27. Vol. 39. No. 9. pp. 419-420; also (in Russian) in *Med. Obozr.*, Moskow. 1912. Vol. 77. pp. 995-1005. With 3 plates and 1 table. [Cited in *Index Medicus.*]

The presence of relapsing fever in Persia has been suspected for many years, but the author is the first to bring forward definite evidence that a spirochaetal infection, closely allied to the relapsing fever of Africa, occurs in this country.

Dr. A. P. WOSNISSENSKY recently sent a number of ticks to the author, together with an account of the ill effects in human beings that resulted from their bites. "Two days after the bite an irritation commences; a copper-coloured spot appears, which later becomes raspberry- and violet-coloured, from the size of a pin's head to that of a lentil; by the end of the fifth day the irritation is very considerable and the scratching of the spot results in the formation of bloody crusts. On the evening of the fifth day the temperature rises, followed by vomiting and delirium during the night. In one patient these symptoms lasted for only two days, whilst in others they continued during four days. The same symptoms reappeared four days later, but this time lasted only two days; afterwards yet three attacks were noted, each of which lasted only 4-6 hours, and could be prevented by quinine and also by subcutaneous injection of arsenical compounds. The spleen is enlarged in all the patients."

In the blood from one of these patients spirochaetes closely resembling *S. duttoni* were found, and to this parasite Dschunkowsky has given the name *S. persica.* [Considering that the parasite is morphologically identical with *S. duttoni* and nothing is known beyond its appearance in stained preparations, this naming seems a little premature.]

Some of the ticks supposed to produce this infection were received by the author and fed on sheep. These animals showed rises in temperature that might be attributed to an attack of spirochaetosis, but parasites could never be found in the blood. The ticks are said to be either *Ornithodorus tholozani or O. canestrinii,* and the author gives photographs of both this tick and of *Argas persicus.*

[Although the evidence is incomplete, there seems little doubt that some species of *Ornithodorus* is concerned in the transmission of relapsing fever in Persia, now definitely recorded for the first time. There is some doubt, however, as to the actual species of tick concerned. NUTTALL and WARBURTON* include *O. canestrinii* amongst their list of doubtful species, and Professor NUTTALL kindly informs me that, from an examination of the photograph given by Dschunkowsky, he is of the opinion that this tick will be found to belong to the species *Ornithodorus lahorensis,* Neumann.]

E. H.

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* *Ticks: A Monograph of the Ixodoidea.* **Part 1. The Argasidae. 1908. Cambridge: University Press.**

Coryllos & Pérakis. **Observations de Fièvre Récurrente constatée pendant la Guerre Balkanique, dans les Hôpitaux de la Croix-Rouge Hellénique à Salonique.**—*Bulls. et Méms. de la Soc. Méd. des Hopit. de Paris.* 1913. Mar. 6. 3 ser. Vol. 29. No. 8. pp. 513-518.

The authors describe in detail four cases of relapsing fever (*S. recurrentis*) occurring in Macedonia. In every case the patients were cured by an intravenous injection of 0·25 gm. salvarsan. The disease has not been previously recorded from this locality, but during the war the authors have been able to collect records of 29 other cases in the various military hospitals of Salonica and Vodena.

In addition it is noted that the four patients that came under the authors' notice were all infested with *Pediculus vestimenti*, and that this parasite is very probably responsible for the transmission of the disease.

E. H.

Lamoureux (A.). **Présence d'*Ornithodorus moubata* dans un Foyer de Fièvre Récurrente à la Cote Ouest de Madagascar. (Présentation de Trois Exemplaires.)**—*Bull. Soc. Path. Exot.* 1913. Mar. Vol. 6. No. 3. pp. 146-149. With sketch map.

The existence of relapsing fever on the west coast of Madagascar was first recorded by Thézé in 1911, and subsequently three cases were noted by Lamoureux in 1912. The author has observed 22 cases of the fever in individuals that had travelled on foot between Morandava and Majunga; therefore it is evident that in this part of the country relapsing fever is endemic. The spirochaete appears to be identical with *S. duttoni* and further evidence in support of this view is afforded by the discovery of *Ornithodorus moubata* at Mitsijo, a village three days south of Majunga. From the records of the military hospital at Majunga, it appears that in July, 1911, out of 29 men that journeyed through the above mentioned district 25 suffered from an attack of fever clinically resembling the present disease. In addition the author quotes some interesting observations by R. Drury (1702-1720), suggesting that relapsing fever has existed in this region for over 200 years. Drury, in an account of his travels and captivity of Madagascar, writes concerning a village to the north of Morondava:—

> "*Fort peu de ceux-ci consentent à séjourner dans les maisons des Vazimbas par crainte d'un insecte semblable à la* Tique des vaches, *qui se rencontre fréquemment sur le bétail et que l'on appelle* "*Poroponjy*"; *cet insecte ne se trouve que chez les Vazimbas qui l'élèvent à dessein pour que les Sakalaves n'entrent point dans leurs maisons.*
>
> "*Or les gens qui sont mordus par les* "*Poroponjy*" *en sont malades pendant six semaines ou deux mois: Ces insectes s'attachent à la peau ou même se glissent dessous; mais une fois qu'on a été mordu et malade, on n'a plus à les redouter et on n'en est plus incommodé par la suite, si nombreux qu'ils soient.*"

E. H.

TRANSMISSION.

NICOLLE (Charles), BLAIZOT (L.), & CONSEIL (E.). **Du Rôle Négatif des Poux dans la Transmission Expérimentale de la Fièvre des Tiques.**—*Bull. Soc. Path. Exot.* 1913. Feb. Vol. 6. No. 2. pp. 106-107.

The authors have attempted to transmit the relapsing fever of Tropical Africa (*S. duttoni*) by means of lice. They employed a virus that had been maintained in mice for such a long time that it had almost lost its virulence for other animals. However, after much difficulty, they infected a very young bonnet monkey, which showed numerous parasites in its blood for three days and then succumbed to the infection.

A number of body-lice were fed on this monkey at the height of the disease, both morning and evening, and subsequently 101 of these lice were fed for 15 days, morning and evening, on a susceptible human being, who remained healthy. In the intervals the lice were kept in a moist chamber at 28° C.

The spirochaetes were observed to disappear from the gut of the louse within two hours after ingestion. Between the eighth and fifteenth days 59 of these lice were dissected and examined with the ultra-microscope, but spirochaetes never reappeared in them as in the case of the North African virus (see this *Bulletin*, No. 1, p. 32). The authors conclude, therefore, that lice are unable to transmit *S. duttoni*, but the results are not very conclusive for, as noted in their article, they employed a very attenuated virus in their experiment.

E. H.

TREATMENT.

ROTHERMUNDT (M.), DALE (J.), & PESCHIĆ (S.). **Das Quecksilber in der Therapie der Spirochäteninfektion auf Grund experimenteller Studien an Tieren.** [Mercury in the Treatment of Spirochaetal Diseases on the Basis of Experimental Studies on Animals.]—*Zeitschr. f. Immunitatsforschung u. experiment Therapie.* 1. Teil., Orig. 1913. Jan. 18. Vol. 16. No. 2. pp. 224-248.

The present paper contains the results of a number of experiments on the therapeutic action of various mercury compounds on spirochaetal infections. In all cases fowls infected with a very virulent strain of spirochaetosis were employed for the experiments. The paper is merely an extension of those previously published by KOLLE, ROTHERMUNDT and PESCHIĆ (see this *Bulletin*, No. 1, p. 38) and KOLLE, ROTHERMUNDT and DALE.

The authors' summary is as follows:—

(1) It is possible to cure fowl spirochaetosis with any mercury preparation if administered in sufficient quantity.

(2) There is no marked difference in therapeutic properties between soluble and insoluble preparations.

(3) The dosis curativa of inorganic and organic mercury compounds belonging to the aliphatic series depends directly on the percentage of mercury in the compound.

(4) On the contrary the action of organic mercury compounds belonging to the aromatic series, *e.g.* Hermophenyl, Asurol, &c., does not depend on the amount of mercury but on the constitution of the compound.

(5) The mercury salt of dimethylphenylpyrazolonsulphamine is found to be the most effective organic mercury compound in the treatment of fowl spirochaetosis.

(6) In this compound the sulphamino group greatly reduces the organotropism without affecting the parasitotropism, the result being a substance in which the relation $\frac{\text{Dosis curativa}}{\text{Dosis toxica}}$ is only $\frac{1}{100}$.

E. H.

UHLENHUTH (P.), MULZER (P.), & HÜGEL (G.). **Die Chemotherapeutische Wirkung on organischen Antimonpräparaten bei Spirochäten-und Trypanosomenkrankheiten.** [The Therapeutic Action of Organic Antimony Compounds on Spirochaetosis and Trypanosomiasis.]—*Deut. Med. Wochenschr.* 1913. Feb. 27. Vol. 39. No. 9. pp. 393-395.

The authors have tested the effects of various organic mercury compounds on spirochaetal and trypanosome infections, but especially on fowl spirochaetosis. The sodium salt of p-aminophenyl-antimonate and also its acetyl derivative were found to have a marked curative action on the disease, the relation of the Dosis curativa and Dosis letalis being about 1:2.

A large number of other compounds were also tried, but only two of them gave satisfactory results. These two compounds, the sodium salts of benzol-sulpho-*p*-amino-phenyl-antimonate and *p*-urethanophenyl-antimonate, both possess marked preventive and curative action on fowl spirochaetosis. Both preparations are easily soluble in water, the first producing an alkaline and the second a neutral solution. The percentage of antimony in the two is respectively 26 per cent. and 32 per cent.

The action of these two compounds on fowls infected with spirochaetosis is shown in a number of tables and their curative action is well marked.

In the case of the sodium salt of benzol-sulpho-*p*-aminophenyl-antimonate the toxic dose is about 0·2 gm. and the curative dose from 0·05 to 0·02 gm. per kilo. The sodium salt of *p*-urethanophenyl-antimonate is even more effective, for the toxic dose is not more than 0·2 gm. whilst the curative dose is 0·02 gm. per kilo, giving a therapeutic coefficient of 1:10.

In conclusion the authors state that they have obtained good results in the treatment of syphilis in rabbits, and relapsing fever, dourine and sleeping sickness in rats, by means of the latter two preparations and also the sodium salt of acetyl-*p*-aminophenyl-antimonate. The action of the latter compound on rabbit syphilis is very marked and will be the subject of a future paper. A human patient suffering from syphilis received a subcutaneous injection of this substance. "The injection was both irritating and painful, but the therapeutic action could not be ignored."

E. H.

PAUCOT (M.). **Action de l'Atoxyl et du Salvarsan sur la Fièvre Récurrente.**—*Bull. Soc. Path. Exot.* 1913. Jan. Vol. 6. No. 1. pp. 68-80.

During the year 1912 an epidemic of relapsing fever occurred in Nam-Dinh (Indo-China), and the author was able to compare the therapeutic action of salvarsan with that of atoxyl on the course of this disease.

The patients treated with atoxyl received subcutaneous injections of 0·5 gm. *pro die* until the spirochaetes disappeared, and any relapses were treated in the same manner. In all thirteen cases were treated with atoxyl, of which six showed relapses. The parasites disappeared only two to five days after the commencement of the treatment, and the convalescence of the patients was prolonged, with marked anaemia and asthenia. It is evident, therefore, that treatment by means of atoxyl must be abandoned in the case of relapsing fever.

One hundred and two patients were treated by subcutaneous injections of 0·2 gm. of salvarsan and only six died. The author remarks that without treatment and proper care the mortality would have been from 50 to 75 per cent. In addition 87 patients were treated by intravenous injections of salvarsan, and the author gives the subsequent clinical history of each case. Six were injected with 0·1 gm. of salvarsan and four of them relapsed, one a second time; eleven patients received injections of 0·15 gm. and four relapsed, two of them a second time; twenty patients were injected with 0·2 gm. and eight relapsed, one a second time; 27 patients were injected with 0·25 gm. and thirteen relapsed, two of them a second time; finally, 23 patients were injected with 0·3 gm. and thirteen relapsed, four a second time. Out of this total of 42 relapses, spirochaetes were only present in the blood of twenty of the cases. Injections of salvarsan considerably delay the appearance of relapses, some of the first relapses not appearing until the 20th to 27th day after the end of the first attack. Usually, in the relapses, spirochaetes are not present unless the dose of salvarsan has been insufficient.

Only two of these patients died and in both cases death was the result of dysentery and not directly due to the fever.

The author advises the employment of intravenous injections of 0·2 to 0·25 gm. of salvarsan in all cases of relapsing fever. This dose ought not to be exceeded, as the results obtained with 0·3 gm. were inferior to those obtained with the smaller dosage, it being understood that this dose refers to Annamites of an average weight of 40 to 45 kilos.

Any relapses should be at once treated by a second intravenous injection of 0·15 gm., which is usually followed by the recovery of the patient within a few hours.

[Although under certain conditions the relapsing fever of Indo-China may present a rather high mortality, the author's estimate of 50 to 75 per cent. seems somewhat excessive. The favourable results obtained by the use of injections of salvarsan are confirmatory of those previously described from the same country (see this *Bulletin*. No. 1, pp. 34-35).]

E. H.

GERBER. **Die bisherigen Erfahrungen mit der Salvarsan- und Neosalvarsanbehandlung der lokalen Spirochätosen.** [The Present Knowledge of the Treatment of Local Spirochaetosis by Salvarsan and Neosalvarsan.] — *Munchen. Med. Wochenschr.* 1913. Mar. 25. Vol. 60. No. 12. pp. 634-636.

The author divides spirochaetal infections into two groups, *viz.*, general and local spirochaetosis, respectively. Under the former heading are included syphilis, yaws and the various relapsing fevers, and under the latter Vincent's angina, gingivitis simplex, noma, &c. The present article contains a useful summary of our knowledge of the action of salvarsan and neosalvarsan on the latter group of diseases, from which it is evident that these medicaments are as effective in local as in general spirochaetal infections.

E. H.

CULTIVATION.

DANULESCO (V.). **Essais de Culture du Spirille de la Poule.**—*Compt. Rend. Soc. Biol.* 1913. Feb. 28. Vol. 74. No. 8. pp. 369-371.

The author has succeeded in cultivating the fowl spirochaete by NOGUCHI's method (*see* this *Bulletin,* No. 7, p. 384) and gives an account of the technique. The blood of a heavily infected fowl is mixed with an equal quantity of sterile sodium citrate solution (1·5 per cent. dissolved in 0·9 per cent. NaCl). Into a tube is put a small piece of rabbit kidney and afterwards ten drops of the citrated blood containing the spirochaetes; then 10 to 15 cc. of sterile, non-filtered, ascitic fluid is added and finally half the tubes receive, in addition, a layer of vaseline. The tubes are then kept at 37° C.

The ascitic fluid was obtained from four cases of cirrhosis of the liver, and the fluid of one of these patients was found to give much better results than that of the other three.

The spirochaetes were found to remain alive at 37° C. from 24 to 36 hours in citrated blood, 48 hours in broth containing a piece of fresh tissue, a little longer in ascitic fluid, and finally 15 to 20 days in the above described medium covered with vaseline.

Subcultures were obtained from cultures that were four to seven days old, and in this manner the author has succeeded in obtaining five passages, after which the spirochaetes seemed to be unable to multiply.

In conclusion Danulesco remarks that the cultures never contain many spirochaetes, are very difficult to obtain, and still more difficult to continue. The method is therefore of little practical use, although undoubtedly of value. Perhaps by a slight modification in the technique it might be possible to obtain better results.

E. H.

UNCLASSED.

DOHI (K.) & HIDAKA (S.). **Sind die Spirochaeten den Protozoen oder den Bakterien verwandt? (Experimentelle Untersuchungen über die Stellung der Spirochaeten im System.)** [Are Spirochaetes related to the Protozoa or the Bacteria? (An Experimental Investigation of the Systematic Position of the Spirochaetes).]—*Arch. f. Dermatol. u. Syphilis.* Orig. 1912. Dec. Vol. 114. No. 2. pp. 493-502.

The authors have investigated the serum reactions in infections of *S. duttoni,* comparing them with those of *Trypanosoma brucei, Spirillum rubrum* and *Vibrio* (Nordhafen) respectively.

The fixation of the complement was tested between spirochaete immune serum and various antigens, but positive results were only obtained with the liver extract of a rabbit infected with the spirochaete. With regard to agglutination and lysis phenomena, they found that immune rabbit serum, one month after infection with *S. duttoni,* in dilutions of 1 in 10 immobilised and agglutinated the spirochaete. In a similar dilution the same serum immobilised, but did not agglutinate *T. brucei,* and was without effect on *Spirillum rubrum* and *Vibrio.*

Similar experiments were performed employing in turn the immune sera of *T. brucei, Sp. rubrum* and *Vibrio,* respectively. In every case, the results are said to support the view that the spirochaetes are related to the Protozoa and not to the Bacteria.

E. H.

ASHBURN (P. M.), VEDDER (E. B.) & GENTRY (E. R.). **A Spirillum in the Blood of a Case of Blackwater Fever.**—*Bull. Manila Med. Soc.* 1912. Dec. Vol. 4. No. 12. p. 198.

The authors observed spirochaetes in the blood of an East Indian in the Philippine Islands suffering from blackwater fever. The morphology of the parasite is practically identical with that of the organisms found in the relapsing fever of India. Relapsing fever has not previously been reported from this locality.

E. H.

HOLMES (J. D. E.). **A Note on Elements resembling Spirochaetes Found in Blood Preparations from Man and Animals.**—*Indian Civil Vet. Dept. Memoirs.* 1912. No. 3. pp. 272-276. With one plate.

The author describes the appearance of various alterations in the blood cells that, in their external form, are very suggestive of spirochaetes. Figures are given of forms observed in the blood of patients suffering from malaria, and also similar bodies occurring in the blood of guinea-pigs that had been inoculated with blood from a malarial patient. Although the forms observed are devoid of structure and are irregular in size and shape, some of them seem to be identical with the forms described by LINGARD as endoglobular stages of spirochaetes. The author also mentions the elements described by the brothers SERGENT* under the title of "*Corps en anneau*" and "*Corps en demilune*" respectively, and in addition BRUMPT has recorded the presence of similar elements in the blood from malarial patients. It appears, therefore, without doubt that all these appearances are of similar origin and are produced by modifications in the red blood corpuscles under the influence of certain diseases and also by haemolytic agents.

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* *Annales de l'Institut Pasteur,* 1905. Mar. Vol. 19. p. 138.

[The extraordinary forms assumed by degenerating corpuscles have been well described by NUTTALL and GRAHAM-SMITH* under the name of haemaconia, and those figured by the author are identical in every respect with those occurring in the blood of dogs suffering from piroplasmosis.]

E. H.

VON PROWAZEK (S.). **Untersuchungen über die Tona der Pferde auf Samoa.** [Researches on the "Tona" of Horses in Samoa.] —*Arch. f. Schiffs. u. Trop.-Hyg.* 1913. Jan. Vol. 17. No. 1. pp. 1-8. With 4 text-figures.

In Samoa the native name "Tona" (signifying yaws) is also applied to two infections of horses that are characterised one by the development of sores in the neighbourhood of the eyes, and the other by the growth of large tumours on the fetlocks. Prowazek shows that the former of these is merely the result of bacterial contamination, whereas the latter, known as "Foot-tona," is caused by separate infection.

The author gives a description of the pathological lesions and etiology of this disease, which is found to be associated with the presence of a spirochaete. This organism, however, only plays a secondary rôle in the development of the tumour and is found, together with fusiform bacilli and other bacteria, in the deeper layers. Attempts to transmit the infection to other horses gave only negative results. A consideration of the histology of the tumour shows that it is probably a carcinomatous condition that secondarily becomes infected with various micro-organisms.

The author also discusses the nomenclature of the spirochaetes, which at present is in a very confused state. Since the use of the name *Spirochaeta* is now restricted to certain free living forms (*S. plicatilis*), it is necessary to decide which generic name should be employed for the pathogenic spirochaetes other than *Treponema*. Amongst the large number of names that have been proposed, Prowazek finds that *Borrelia* (SWELLENGREBEL, July 1907) has priority, for the term *Treponema* is not applicable until *T. pallida* has been proved to belong to the same genus as the other pathogenic spirochaetes. Figures are given of the *Borrelia* occurring in the Foot-Tona of horses. The author distinguishes three types of parasites named *Borrelia tonae magna, media* and *minima,* respectively. These were found to multiply by transverse division, but appearances suggesting longitudinal division were also encountered.

E. H.

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* *Journal of Hygiene.* 1907. Vol. 7. p. 268.

KALA AZAR.

Nicolle (Charles). **Origine et Rapports du Kala Azar et du Bouton d'Orient. Rapport présenté le 27 Septembre 1912 à la 8e Section du XVe Congrès d'Hygiène et de Démographie de Washington.**—*Arch. de l'Inst. Pasteur Tunis.* 1912. No. 4. pp. 219-224.

This paper contains a brief resumé of the state of our knowledge of the various leishmaniases. Only one or two points will be noted. The author, who created the name *Leishmania infantum* for the parasite of the Mediterranean infantile kala azar to distinguish it from the Indian parasite *Leishmania donovani*, points out that nearly all the supposed differences between the Indian and Mediterranean diseases have been disproved. There still remains the fact that so far no one has yet succeeded in reproducing the Indian disease in dogs while the Mediterranean disease can be thus reproduced fairly readily. At present then the author is inclined to retain the name *Leishmania infantum* for the Mediterranean parasite. As regards the disease known as oriental sore and by a host of other names the author believes that all over the Old World there is but one cutaneous leishmaniasis always due to the same parasite (*Leishmania tropica*). It still remains to be proved whether the cutaneous leishmaniasis of South America is due to the same or another parasite. It is pointed out that the claim of Basile that he has transmitted kala azar from dog to dog by means of fleas and the later and similar experiments by the brothers Sergent and others (see this *Bulletin*, No. 7, p. 368) fit in well with what is known of the distribution of the Mediterranean form of the disease in dog and man. He points out that Patton's claim that the bed bug transmits Indian kala azar, based on the development undergone by the leishmania in this insect, is without foundation and that only positive transmission experiments can determine the carrier. The problem of the transmission of oriental sore still remains unsolved, but the author hopes to find the reservoir (animal or plant) of the virus, if such exists, as he has already done in the case of kala azar.

C. M. Wenyon.

Gabbi (U.). **Intorno all' Origine Canina della Leishmaniosi Interna (Kala-azar).** [The Canine Origin of Kala Azar.]—*Malaria e Malat. d. Paesi Caldi.* 1913. Jan. Vol. 4. No. 1. pp. 7-19.

This long paper contains no original matter but is a review of previous work, made with the object of showing that Nicolle's idea of the identity of canine and infantile kala azar in the Mediterranean district is untenable. It is pointed out that in those districts where the canine and human diseases exist there is no parallelism between the numbers of each. The transmission experiments of various observers are criticised on the ground that adequate precautions had not been taken to exclude the possibility of a previous infection of the animals employed. The well-known argument that the flagellates in the fleas used in these experiments may be other than leishmania is again brought forward. Most of the points in this paper have been already emphasized by the author and others in earlier papers, and are generally quite evident to anyone conversant with the details.

[In spite of a want of parallelism in the numbers of cases and in the seasonal incidence of canine and infantile kala azar (even if the data available are reliable enough to warrant such a statement), it still remains a fact that the two diseases occur side by side all along the Mediterranean coast; the human disease is inoculable into dogs and produces symptoms indistinguishable from those of the natural canine disease, so that it appears to the writer of this review that it is more reasonable to assume that the two diseases are identical than that they are distinct.]

C. M. W.

LAVERAN (A.). **Au Sujet de l'Historique du Kala-azar Méditerranéen.**—*Bull. Soc. Path. Exot.* 1913. Jan. Vol. 6. No. 1. pp. 23-24.

GABBI (U.). *Ibid.* Mar. No. 3. pp. 141-143.

Laveran recalls the fact that the first case of Mediterranean kala azar noted was one seen by Dr. CATHOIRE in March 1904 at La Goulette (Tunis). The patient, a child of seven months, was seen only at the last stage of its illness. It was found post mortem to have a large spleen, and Dr. CATHOIRE forwarded smears of this organ to Professor Laveran because of certain structures he had encountered in the stained films. Laveran gave a description of the organism before the meeting of the Academy of Medicine on March 22nd, 1904. His description was an accurate one, and he called attention to the marked resemblance between these bodies and those discovered the year before by LEISHMAN and DONOVAN in cases of Indian kala azar. He emphasized the necessity for a close enquiry into this new disease which Dr. CATHOIRE had shown to exist in Tunis. It was in the following year (1905) that PIANESE described the first case of the disease from Italy, though his description of the parasite was less accurate than that of the author given the year before. The author's object in calling attention to these facts is to show that Mediterranean kala azar was first recognised by CATHOIRE and himself and not by PIANESE who is frequently credited with having made the discovery first.

Gabbi claims that the disease was recognised clinically by CARDARELLI in Naples in 1880, but Laveran considers that the symptoms of the disease are not sufficiently characteristic to enable one to be sure of this, so that the discovery of the disease must date from the discovery of the parasite.

C. M. W.

TRANSMISSION.

SCORDO (F.). **Sulla Questione della Trasmissibilità del Kala-azar per mezzo di alcuni Insetti Ematofagi.** [The Transmission of Kala Azar by Blood-Sucking Insects.]—*Malaria et Malat. d. Paesi Caldi.* 1913. Jan. Vol. 4. No. 1. pp. 20-32. With 1 plate.

The greater part of this paper is occupied with a discussion of the work previously done by various observers on the transmission of kala azar by means of biting insects.

An account of some experiments conducted with mosquitoes (both anophelines and Culex) and cultures of *Leishmania infantum* is then given. Some difficulty was experienced in inducing the mosquitoes to take up the culture. In order to prevent their becoming involved in the liquid, the author took up the culture fluid by soaking in it small pieces of flesh. These were then enclosed in a piece of gauze which was suspended under a glass. It was easy to observe the mosquitoes feeding through the gauze, and one could be certain that they had taken up the culture as their abdomens became distended with the red fluid. Directly after feeding it was found that the fluid in the stomach of the mosquitoes contained all the cultural forms. Soon after these commenced to degenerate, so that after the lapse of six hours it was difficult to find any forms not in advanced stages of degeneration. After twelve hours no leishmania could be found. These experiments do not agree with the similar ones conducted by FRANCHINI,* who found that the cultural forms taken up by mosquitoes survived for 48 hours and that the flagellate forms became transformed into small round forms. The author doubts very much whether the bodies seen by FRANCHINI were in reality developed from the cultural forms taken up. Similar experiments have been made by BASILE and FRANCHINI with bugs and fleas, but these observers never observed any flagellates in these insects, so there is no proof that the fleas or bugs had ever taken up any culture. In the author's opinion there is no evidence that the cultural forms of leishmania will live and develop in mosquitoes, and he regards this as an argument against the mosquito transmission theory of kala azar. The paper concludes with a general discussion on the insect most likely to be the transmitter of the disease.

C. M. W.

CLINICAL.

LIGNOS (Antoine). **Un Cas de Fièvre Réellement Noire (Kala-azar) observé à Hydra.**—*Bull. Soc. Path. Exot.* 1913. Feb. Vol. 6. No. 2. pp. 114-117.

The author records a case of kala azar in a child of one year from the Isle of Hydra. The illness, which was of under four months' duration, followed the usual course with irregular fever, large spleen and liver reaching the left and right iliac crests respectively, anaemia and other usual symptoms. The peculiar feature of the case, however, was one which has been noted in this disease by the physicians of Hydra long before it was recognised as a leishmaniasis. A week before the child's death the author noted that the face showed some black patches. During the succeeding days the general black tint of the face increased in intensity and the same condition, though less marked, was seen on the skin of the body. The author describes the child's appearance as being that of a candle which has become smoked as a result of burning in a wind or of one's fingers which have become blackened through attempting to produce a fine point on a lead pencil. At the autopsy leishmania were discovered in the organs.

C. M. W.

MAZZITELLI (Pietro). **Intorno a un Caso di Anemia Infantile da Leishmania proveniente da Monte S. Biagio in Provincia di Caserta.** [A Case of Infantile Kala Azar from Monte S. Biagio.]—*Policlinico.* Sez. Medica. 1913. Feb. Vol. 20. No. 2. pp. 78-88.

This paper commences with a long summary of the present state of our knowledge of kala azar. The author then describes in great detail a typical case of the disease in a child six years old from Monte S. Biagio in the province of Caserta near Rome. This is the fourth case encountered in this district, GABBI (1910), BASILE (1911) and CONCETTI (1911) each having recorded single cases from Rome.

C. M. W.

SPAGNOLIO (G.). **Leishmaniosi Interna (Kala-azar) a Messina. Nuovi Esempi Clinici e Sguardo Riassuntivo.**—*Riforma Medica.* 1913. Feb. 22. Vol. 29. No. 8. pp. 199-201.

This paper is substantially the same as an earlier one by the same author, for a notice of which see this *Bulletin.* No. 7. p. 361.

C. M. W.

MIGONE (L. E.). **Un Cas de Kala-azar à Asuncion (Paraguay).**—*Bull. Soc. Path. Exot.* 1913. Feb. Vol. 6. No. 2. pp. 118-120.

The case described is that of an Italian who went to South America in 1897. He lived in Santos (Brazil) till 1910 when he removed to Sao Paulo to obtain work in connection with the railway. In February 1911 he became ill with rigors, fever, diarrhoea and lassitude. He had had a similar and first attack some time before. He was treated with quinine without definite result. Not being satisfied with his progress he went to Asuncion in the Middle of May. On arrival his condition was as follows.—He was much wasted, weak, very anaemic with spots on his face, back, chest and the back of his hands; the abdomen was prominent and his respiration laboured; the tongue was coated; fever (38-39·5° C.) preceded by rigor occurred every afternoon; there was epistaxis and dysentery; the spleen and liver were both enlarged, smooth, and slightly tender. As the patient did not react to quinine a very careful examination of the blood was made, with the result that a leishmania was discovered. The diagnosis was confirmed by a further examination of material drawn directly from the liver and spleen. The case was undoubtedly one of kala azar and not malaria as had been supposed. The blood picture was as follows: Red corpuscles 3,900,000, white corpuscles 3,400 (polynuclears 49 per cent., lymphocytes 10 per cent., mononuclears 36 per cent., eosinophiles 1 per cent.).

The patient received an intramuscular injection of 0·60 gram of '606.' Following this there was some temporary improvement in his condition, but a month later after a severe attack of diarrhoea he died. The parasites had persisted in the blood and also in the spleen. No satisfactory autopsy was performed.

At the time that the author encountered this case he was engaged in studying the disease known as Bouba, due to a leishmania. This parasite however appears smaller than that encountered in kala azar, and further in Bouba the parasite occurs neither in the peripheral blood nor in the internal organs.

[This is the first case of kala azar recorded from South America.]

C. M. W.

EXPERIMENTAL.

LAVERAN (A.). **Infections du Cobaye, du Lapin et du Chat par la** *Leishmania infantum.*—*Bull. Soc. Path. Exot.* 1913. Feb. Vol. 6. No. 2. pp. 110-114.

The author passes in review the various attempts, successful and otherwise, which have been made to infect guinea-pigs, rabbits, and cats with *Leishmania infantum.*

Guinea-pig. In 1909 the author in conjunction with PETTIT showed that the leishmania obtained from the organs of infected animals would survive in the peritoneal cavity of guinea-pigs for at least 59 days and were still culturable in NNN medium. FRANCHINI (1911) obtained a general infection of a guinea-pig by the injection intraperitoneally of 1 cc. of a fifteen days old culture which was in its eighth passage. This is the sole success against many failures after inoculation of both virus and culture by NICOLLE and BLAIZOT, the author and others, though the intraperitoneal, intravenous, and intrahepatic methods of inoculation were all attempted.

Rabbit. VOLPINO produced a local lesion on the cornea of a rabbit by scarification and application of a piece of bone marrow from an infected dog. Three months later there was a keratitis which yielded large mononuclear cells containing leishmania. MANTOVANI produced a general infection by the intravenous injection of 1 cc. of culture. Twenty days later the animal was killed and leishmania were found in its organs which yielded a culture of flagellates when inoculated on to NNN medium. Many unsuccessful attempts have been made by the author and others to infect these animals both from virus and culture.

Cats. In spite of many attempts with these animals no one has yet succeeded in infecting them with *Leishmania infantum.* Though many cats have been examined in those districts in which dogs are known to be naturally infected, the only instance in which the examination yielded a positive result was in the case of a young kitten examined by the brothers SERGENT, LOMBARD, and QUILICHINI in Algiers. In this instance the cat was associated with a dog and child both infected in the same house.

It thus appears that attempts to infect these animals with *Leishmania infantum* yield in most cases negative results. The conditions which have given positive results in a small number of cases have not been determined.

C. M. W.

Bandi (Ivo). Preliminary Note on the Identity of Certain Leishmaniases based on Biological Reactions.—*Jl. Trop. Med. & Hyg.* 1913. Feb. 15. Vol. 16. No. 4. p. 50.

The author has observed that the repeated intravenous injection of rabbits with cultures of leishmania of human or canine origin gives rise to no disease, but on the other hand causes the appearance in the blood of substances capable of agglutinating the cultural forms. The serum of rabbits injected with cultures of canine leishmania agglutinated cultures both of canine leishmania and *Leishmania infantum* in dilutions of 1 in 160. The sera of these rabbits further produced agglutination of cultures of *L. tropica* in a dilution of 1 in 70. There appears to be a leishmanial group agglutination. These experiments tend to support Nicolle's view as to the identity of the parasites causing the infantile and canine kala azar.

C. M. W.

Canine Kala Azar.

Lignos (Antoine). **L'Infection par Leishmania des Chiens de l'Ile d'Hydra.**—*Bull. Soc. Path. Exot.* 1913. Feb. Vol. 6. No. 2. p. 117.

The population of Hydra is not over 6,000 and the annual birth rate has a maximum of 120; yet at least ten children become infected with kala azar each year, a fact which shows that the disease is more common in this island than in other countries in which kala azar occurs.

During the summer of last year the author examined 48 dogs, being half the total number of these animals in the island. He would have continued the observations further but for the inhabitants of the island, who objected to having their dogs killed. The following results were obtained:—

May	5 dogs examined,	1 infected.
June	16 ,, ,,	2 ,,
July	8 ,, ,,	1 ,,
August	10 ,, ,,	1 ,,
September ...	7 ,, ,,	2 ,,
October	2 ,, ,,	1 ,,

This result gives a percentage of 16·66 dogs infected.

C. M. W.

Gray (A. C. H.). **Leishmaniose Naturelle du Chien à Tunis.**—*Bull. Soc. Path. Exot.* 1913. Mar. Vol. 6. No. 3. pp. 165-166.

This paper refers to the examination of dogs in Tunis for evidence of leishmania infection. Nicolle and Compte, during March, April and May 1908, found four dogs infected out of 222 examined. W. and N. Yakimoff examined 299 dogs from January to May 1911 and found five infected. Apart from these examinations Nicolle discovered a dog with the disease at Khéreddine near Goulette (a suburb of Tunis) in July 1911, and in September of the same year Langeron found another.

The writer of the present paper has made a further examination of Tunisian dogs between October 16 and December 5, 1912, with the result that he discovered two cases of infection out of 127 dogs examined. From the three series of examinations it appears that the percentage of Tunisian dogs suffering from kala azar varies from 1·8-1·6.

C. M. W.

TROPICAL SORE.

PULVIRENTI (G.). **La Leishmaniosi Cutanea nelle Provincie di Catania e Caltanissetta.** [Dermal Leishmaniasis in the Provinces of Catania and Caltanissetta.]—*Malaria e Malat. d. Paesi Caldi.* 1913. Jan. Vol. 4. No. 1. pp. 32-43. With 7 text-figures.

The first cases of dermal leishmaniasis or oriental sore to be described in Italy were those of GABBI and LA CAVA (1910) from Calabria and Sicily. Other cases were described later by TIMPANO (Bova Marina), by SERGI (Palizza Marina), by COSTA (Riace Camini), by JEMMA (Palermo) and by GENOESE (Cantonia). During the years 1911 and 1912 the author has encountered six cases of this disease, one from the province of Caltanissetta and five from the province of Catania. In each of these there was a single lesion on some part of the face, ear or lips. The ages of the victims varied from 3 to 55 years. In one case the sore on the lips was situated at the right angle of the mouth and had extended to the lining mucosa of the cheek. The author compares this case with the South American leishmaniasis in which, however, a much more extensive involvement of the mucosae occurs. In other respects the six cases described offer no peculiar features.

A lengthy discussion on the relation of oriental sore to kala azar is added. Some experimental work with a view to determining this relation was undertaken. A monkey (*Macacus sinicus*) was inoculated intrahepatically with material obtained from the sore of one of the cases. The monkey developed no symptoms, but a liver puncture was performed about forty days after the inoculation. In smears stained by Giemsa leishmania were found. A month later the monkey being in good condition was killed. Examination of the organs microscopically and by culture gave a negative result. The author makes no comment on the result of this experiment.

C. M. W.

CIPOLLA (Michelangelo). **Ein Fall von Orientbeule in der Provinz Palermo.** [A Case of Oriental Sore in the Province of Palermo.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1913. Jan. 23. Vol. 67. No. 7. pp. 521-523. With 2 figs.

This paper describes a case of tropical sore in a girl of fifteen years of age from the Province of Palermo. There was a single sore about one centimetre in diameter on the cheek beneath the right eye. Leishmania were discovered in material taken from the sore. The case was a typical one.

C. M. W.

Castellani (Aldo). **Indian Oro-Pharyngeal Leishmaniasis.**—*Jl. Trop. Med. & Hyg.* 1913. Feb. 15. Vol. 16. No. 4. pp. 49-50. With 2 figs.

The case described is that of a European aged 38 who had been in India for 20 years. He consulted the author for an ulcerative condition of the throat which had commenced nine yeais before. A local examination showed the presence of several ulcers on the posterior wall of the pharynx and on the soft palate; they were roundish and mostly from about a quarter to half a centimeter in diameter. There was no tendency to the formation of vegetations nor any framboesiform appearance. The lymphatic glands of the neck were not enlarged and the condition produced a certain amount of discomfort but little pain. A physical examination showed the spleen to be just palpable on deep inspiration. Scrapings from the ulcers showed typical leishmania in small numbers. The author saw a similar case some time before but a diagnosis of leishmania was not made. There were no cutaneous lesions of any kind in these cases; both patients had suffered from fever from time to time but they had regarded this as malaria.

The author was not in a position to follow up either of these cases, so was not able to determine whether they were cases of kala azar with local lesions in the throat, or merely oriental sore in this position, or a disease like the oral leishmaniasis of South America. The duration is against the kala azar view and the character of the lesions is not that described for the South American disease. The author says therefore that the possibility cannot be excluded of there being an Indian or Asiastic type of oro-pharyngeal leishmaniasis.

C. M. W.

Migone (L. E.). **La Buba du Paraguay, Leishmaniose Américaine.** —*Bull. Soc. Path. Exot.* 1913. Mar. Vol. 6. No. 3. pp. 210-218.

This paper gives an account of the disease known as "Buba" in Northern Paraguay. It is the form of leishmaniasis which occurs in other parts of South America and has been described by Escomel, Carini, Splendore (see *Kala Azar Bulletin,* No. 2, p. 103, etc. and this *Bulletin,* No. 1, pp. 11-14). The disease commences as a papilloma on some exposed part of the body as in oriental sore. Ulceration of this may follow, and eventually after eight or nine months lesions appear in the nose and mouth in the form of either ulcers or papillomatous growths. However severe these nasal and buccal lesions the tongue and bones of the face never appear to be involved in the destructive process. The primary cutaneous lesions may be single, but frequently several papules appear at once. After four or five months as many as forty cutaneous lesions may be present, varying in size from that of a 1 to that of a 5 franc piece or even covering the entire dorsum of the foot or encircling the limb. A feature of the disease already noted by other observers is the involvement of the lymphatic system. There is a lymphangitis with the formation of hard red subcutaneous cords and nodosities; the lymphatic glands draining the region of the ulcer are at first large and painful, but later, though they remain enlarged, the pain disappears. The ulcers may show a tendency to develop granulations in the form of framboesia-like tumours or they may remain crusted over and level with the skin. After involvement of the nasal and buccal cavities the whole lining mucosa including that of the larynx ultimately becomes affected, so that breathing and deglutition become difficult. The nasal septum is destroyed and the margins of the nostrils and lips become gradually eroded. The condition can readily be confused with lupus, syphilis, sporotrichosis, cancer, etc. The victim suffers from a peculiar bronchitis, with fever, pains, and anorexia and finally dies of tuberculosis or some other intercurrent malady.

The disease shows no predilection for any age or sex or any nationality. The infection takes place in the forest districts and is so prevalent in some localities that of 100 labourers who enter the forest regions after two or three months 70 or so will return infected, some with one or two ulcers, others with ten or twelve, and some with thirty or forty distributed over various parts of the body. The disease has apparently spread from Brazil, and owing to lamentable negligence the ulcer has developed to such an extent in the district that hardly a house exists in which several people are not infected. The author points out that the disease appears to have been described by SAUVAGE and CHARLUIS as long ago as the year 1759.

The victims are unanimous in attributing the disease to the bite of some noxious arthropod. The one most commonly accused is a tick of the genus Amblyomma. [FLU is inclined to regard a tick as the cause of "Bosch yaws" or "Forest yaws," also a leishmaniasis, see *Kala Azar Bulletin*, No. 2, p. 109.] The author however believes he has seen the initial lesions commence at the wounds inflicted by other insects such as mosquitoes and horse flies or even thorns of plants.

It is always possible to discover leishmania in the lesions both cutaneous and mucosal, though it may be difficult in the more chronic ones. The author has not succeeded in inoculating the disease in animals nor in obtaining a culture of the organism on blood agar (see this *Bulletin*, No. 1, pp. 12 and 13).

As regards treatment the early lesions are easily got rid of by the use of caustics or the thermocautery, together with iodide of potassium and arsenic by the mouth. When the cutaneous lesions are more advanced a cure is difficult to effect, though cauterisation together with '606' repeated three or four times has given good results. In the final stage when the mucosae are involved the disease is very intractable, but hectine with '606,' orsudan, or soamin has favourably modified the condition. Healing is however exceedingly slow and local application of caustic is always necessary. In these cases even after three or four injections of 60 centigrams of '606' or three months' treatment with soamin it has still been possible to detect the parasites in the lesions.

The paper is illustrated with four photographs showing the serious conditions which may result from this disease.

C. M. W.

FRANCHINI (G.) & MANTOVANI (M.). **Il Primo Caso di Leishmaniosi Cutanea Brasiliana in Italia Diagnosticato col Reperto del Parassita.**—*Pathologica.* 1913. Mar. 15. Vol. 5. No. 105. pp. 163-171.

FRANCHINI (G.). **Sur un Cas de Leishmaniose Américaine. Le Premier Cas en Italie avec la Constatation du Parasite.** *Bull. Soc. Path. Exot.* 1913. Mar. Vol. 6. No. 3. pp. 219-226.

The case here described is that of an Italian who had resided in Brazil for several years. He returned to Italy and was seen by the author on account of a peculiar and intractable ulceration which had commenced three years before at the gluteal fold at the upper part of the left thigh. The ulceration, which was at first slight, had extended in spite of vigorous treatment both surgical and medicinal till the condition described was reached. There was a large lesion about seven centimetres in length consisting of ulcerated and inflamed foci partly covered with scabs and partly discharging a purulent fluid. Surrounding this were others smaller but of the same nature. On the right gluteal region were several similar but smaller lesions. The patient appeared healthy and no other abnormal feature was found. The Wassermann reaction was always negative.

The diagnosis was made by the finding of leishmania in scrapings from the sore and also by the obtaining of a culture of the organism on NNN medium by abstracting blood from the margin of the lesion. The parasite is described as showing large forms 5μ-6μ in diameter, medium sized forms 2μ-$3{\cdot}5\mu$ and finally small oval forms $1{\cdot}5\mu$-2μ in diameter. The author has noted that some of the parasites show the peculiar flattening of the trophonucleus against the margin as first described by LAVERAN and NATTAN-LARRIER (this *Bulletin.* No. 1. pp. 12 and 13). Parasites were never found in blood taken at a distance from the lesion nor were any flagellate forms seen. In culture the flagellates present the characters usually seen in cultural forms of leishmania. The author mentions them as having a length of 10-15μ and a breadth of $1{\cdot}5$-$2{\cdot}5\mu$; the flagellum is sometimes 40μ in length. [Culture of the leishmania from S. America skin lesions has been previously described—PEDROSA & DIAS DA SILVA (*Kala Azar Bulletin.* No. 2. p. 103), PIRAJA DA SILVA (this *Bulletin.* No. 1. p. 14) and WENYON (*Ibid.*, p. 15).]

With scrapings from the lesions animals were inoculated as follows:—Three guinea-pigs with the result that suppurating foci developed. In scrapings from these very rare leishmania were found; they had disappeared in nine days. A similar condition developed in one of a series of rats inoculated after nine days. In this lesion also very rare but distinct leishmania were found. An even less definite result was obtained in the case of a dog. [Successful inoculation of this disease is described by SPLENDORE and by WENYON (this *Bulletin.* No. 1. pp. 11-14).] The inoculation of cultures has given only negative results.

The case was treated by excision of the lesions with subsequent grafting of skin. A complete cure resulted. The histological

findings are described in detail. It is interesting to record the presence of undoubted giant cells [previously noted by **Nattan-Larrier, Touin** and **Heckenroth,** *Kala Azar Bulletin*. No. 2. p. 107].

The author believes, as others have done, that the leishmania causing this cutaneous disease in South America is distinct from that of oriental sore both on morphological grounds and on account of the greater severity of the American disease.

C. M. W.

UNCLASSED.

Dendrinos (Georges). **Ueber einen neuen Krankheitserreger der Trypanosomengruppe.** [A New Pathogenic Organism of the Trypanosome Group.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1913. Feb. Vol. 68. No. 1. pp. 29-30. With 1 plate.

The author records a new disease occurring in Greece in North Cephalonia. He describes three stages—first a stage of fever and general weakness, secondly a stage of splenic enlargement with outbreaks of fever, and thirdly a final stage wherein the spleen may extend to the iliac fossa, the liver enlarge and the fever reach 40° C. In this stage the body may be covered with a toxic exanthem. The disease, which may last three or four years, nearly always ends fatally. The condition is diagnosed by the finding of the parasite on puncture of the spleen. The parasite is described as occupying a position intermediate between the Piroplasmata and Leishmania. It is described as being elongated with one end blunt and the other pointed. Its length is 3μ and there are two nuclei as in leishmania, but these lie close together. A plate with five figures illustrates the paper.

[It certainly appears even from the character of the symptoms alone that the author is dealing with kala azar, which is known to occur in various parts of Greece. The description of the parasite corresponds exactly with certain forms of leishmania met with in both kala azar and oriental sore, and the figures in the plate being microphotographs show typical leishmania such as one expects to find in the spleen smears from cases of kala azar. It seems most probable, therefore, that the author is describing kala azar though he does not think so. He appears not to be aware that this disease exists in Greece and has only been able to compare his parasite (stained in smears with Romanowsky stain) with leishmania as seen in sections shown him by Prof. **Marchand**. There seems no reason to regard the parasite as other than a typical leishmania.]

C. M. W.

Rocha-Lima (H. da). **Beitrag zur Kenntnis der Blastomykosen.** [Contribution to the Knowledge of Blastomycosis.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1912. Vol. 67. No. 4. pp. .

This paper has to do with two parasites which have often been supposed to be of protozoal nature and closely related to the leishmania. The first one considered is the ***Cryptococcus farciminosus***

causing the lymphangitis of horses. The author shows very clearly that the organism in question is none other than a yeast and that its resemblance to leishmania is only a superficial one owing to the fact that the parasite is found in numbers embedded in the protoplasm of mononuclear cells. Quite comparable appearances can be produced by the injection of yeasts into animals. The second parasite is the *Histoplasma capsulatum* which was found by DARLING in Panama in the tissues of one Chinaman and two negroes who had died of some obscure malady. The symptoms of the disease were wasting, irregular remittent fever, spleen enlargement and anaemia with leucopenia. Post mortem there was found an invasion of the endothelial cells of the small lymph and blood vessels with an enormous number of parasites which caused necrosis and cirrhosis of the liver, enlargement of the spleen, pseudogranulomata in the lung and ulceration of the large and small intestine, as well as necrosis in the corresponding lymphatic glands. As in the case of the Cryptococcus, the position within the cells produced a certain resemblance to leishmania invasion. In this case also the author shows that the Histoplasma is in reality a yeast-like organism and has nothing to do with the Protozoa. Both the Cryptococcus and the Histoplasma are closely related to the Blastomycetes.

C. M. W.

MALARIA.

Fry (A. B.). First Report on Malaria in Bengal. 42 + v. pp. With 10 maps, 11 charts, and numerous tables. F'cap. 1912. Calcutta: Bengal Secretariat Book Depot. [Price—Indian, Rs. 3-8; English, 5*s*. 3*d*.]

The author concludes from his investigations:—

1. The percentage of error in the figures for total births and total deaths in Bengal is small.

2. The heading "fever" includes all febrile diseases except small pox and the majority of cholera and plague cases. One third or less of the cases under the fever headings are due directly or indirectly to malaria.

3. The remaining two-thirds of the cases classed under the "fever" heading are made up of deaths from multifarious diseases and these in all probability do not vary greatly from year to year. The annual fluctuations of the "fever" death-rate are a measure of the variation of malaria mortality.

Malaria in Lower Bengal.—The Anopheline mosquitoes found were:—*Nyssorhynchus fuliginosus*, and variety *adiei; Nyssomyzomyia rossi; Myzorhynchus nigerrimus; Neocellia fowleri; Myzomyia culicifacies; Myzomyia listoni; Myzomyia albirostris; Myzorhynchus barbirostris; Nyssomyzomyia rossi*, variety *indefinata*.

The first named exists in greater numbers than all the other species put together. There is some reason to believe that it is a carrier of malaria.

He thinks that the splenomegaly in Lower Bengal is chiefly due to malaria and that the few cases due to kala azar may be safely neglected. An examination of 752 blood films showed 497 negative, 89 malignant tertian, 128 benign tertian, 20 quartan and 18 mixed infections. He points out with charts and tables that there is a large area in Lower Bengal in which malaria is hyper-endemic.

Statistics of Malarial Mortality in Lower Bengal.—There are marked annual variations in the malaria mortality, the true cause of which he could not ascertain. He was unable to find any correlation of this with rainfall, or rise in price of food. There is also a monthly variation in malaria mortality. July usually shows the minimum, while April and November or December show as a rule the maximum malaria death rate. The highest point in the curve representing malaria mortality is about two months later than the highest point in the curve representing the number of malaria cases. He thinks that the season of new infections from mosquitoes begins in July; the resulting maximum sickness is attained in October and the maximum mortality in December.

The Hyper-endemic Area (Jessore and Nadia).—Villages anywhere in these districts showed a spleen rate of over 50 per cent. Blood films gave an endemic index of 33 per cent.

Certain very swampy areas are more free from malaria than higher better drained areas. He is unable to account for this, because of the lack of knowledge regarding the chief malaria-carrying mosquito in Bengal.

Previous Antimalarial Measures in Bengal.—The whole history is a melancholy record of energy and money wasted on totally inadequate schemes. The result of quinine distribution has been disappointing. The author agrees that village sanitation is at the root of the matter. The vast bulk of the people are illiterate and quite ignorant and apathetic regarding the value of quinine.

Malaria in Chota Nagpur.—September to October is the time of maximum death rate from "fever." The author examined three sections.

(1) In the flat plains of Manbhum, the villages are practically free from malaria and there are few mosquitoes.

(2) In the "Terai" region the villages situated at the foot of the plateau and on the slopes of the hills suffer from hyper-endemic malaria. There are no swamps and the draining streams are swift; yet mosquitoes are very abundant.

(3) The villages on the plateau itself harbour many mosquitoes due to their insanitary condition. He thinks that the anti-malaria problem in these districts is much more simple than in Lower Bengal.

Details are given of the conditions in other districts.

The appendix gives a report on malaria in Dum-Dum by Assist. Surgeon Chandra GHOSH.

D. Thomson.

JAMAICA. **Annual Report of the Malaria Commission for the Year ended 31st March, 1912.**—38 pp. With 2 charts. F'cap. 1912. Jamaica: Government Printing Office, Kingston.

In Jamaica Sanitary Officers have been appointed in twenty districts which are under the control of the Local Board of Health in each parish. Courses of instruction have been instituted for the training of Sanitary Inspectors. Fourteen Medical Officers of Health have been appointed by the Parochial Board of fourteen districts. The duties of Medical Officers of Health are regulated by each Parochial Board and bye-laws have been drafted by the Central Board of Health for approval and adoption in the several parishes. The sanitary expenditure during the past year in Kingston was £6,024, while that for the rest of the island was £6,480. Swamp lands have been investigated, but it has been deemed inadvisable so far to undertake anything of the nature of a specific permanent improvement. Owing to the high prices demanded for sand dredgers for which tenders were invited, the intention to purchase one has had to be abandoned for the present. Many antimalarial measures however have been carried out, and further recommendations have been made in this respect.

Seventeen police stations have been screened with satisfactory results. Quinine is distributed to the children in the schools. Tables are given which show that the imported East Indian coolies are more susceptible to malaria than the Jamaica negroes. Further tables of the Police Returns show that malaria has diminished very markedly in the force during the last two years. Statements of expenditure and reports by the Secretary of the

Commission on inspections made during the period under review are appended.

[This is a very excellent and valuable report and shows that important steps have been taken to organise a more thorough system of sanitation in the island of Jamaica. Those interested should consult the original.]

D. T.

Firth (R. H.). **The Nature and Detection of Apyrexial Malaria.**—*Jl. R. Army Med. Corps.* 1913. Feb. Vol. 20. No. 2. pp. 129-134.

The author points out the importance of detecting apyrexial or dormant malaria, which is liable to cause much inefficiency among troops because it remains undiagnosed and in consequence is not treated. He defines dormant malaria as that apyrexial period in a malarial infection during which the parasites are still in the peripheral blood or deeper organs, but not present in the asexual stage in sufficient numbers to cause the clinical phenomena of fever or ague.

Regarding the methods of detecting apyrexial or dormant malaria he states that he is not familiar with the thick film method of Ross, but suggests that Thomson's work on the leucocytes in malaria may help to solve the problem. By making a total and differential leucocyte count frequently for two or three days, one may detect the violent fluctuations in the number of leucocytes and the high mononuclear percentage during leucopenia, described by that author. He was able to detect dormant malaria in one of his cases by that method.

Further corroborative evidence of the existence of this form of dormant malaria may be obtained by examining the urine for urobilin, according to the method of Plehn. A positive urobilin test indicates that blood pigment is being destroyed, and excluding other diseases this destruction is probably due to unsuspected malaria, especially if there is no pyrexia.

D. T.

Bignami (Amico). **Concerning the Pathogenesis of Relapses in Malarial Fevers.** [Translated by W. M. James.]—*Southern Med. Jl.* 1913. Feb. Vol. 6. No. 2. pp. 79-88.

Bignami points out that one of the most debated and obscure questions in the pathology of malaria is the genesis of relapses. These occur in all kinds of malarial infections, sometimes separated by brief intervals of apyrexia, at other times by long periods of latency. The hypothesis that relapses are due to parthenogenesis in gametes is by no means convincing, since this supposed phenomenon has been seen only by a few in spite of the fact that very many competent observers are constantly searching for it. The plates illustrating parthenogenesis by the few observers, **Schaudinn**, **Karrewig** and **Neeb**, are unconvincing. The translator, referring to these illustrations and also to those of **Deaderick**, **Craig**, and **Harrison**, agrees with the author that they are insufficient to convince one that they represent parthenogenesis in gametes; he is inclined to believe that the forms depicted are atypical sporulating schizonts, frequently seen in anaemic blood.

The author thinks that there is more reason to believe that relapses are due to small numbers of the asexual parasites which have escaped the action of the specific remedy. These follow their accustomed life cycle without increasing in number for varying periods of time and cause no fever. When the patient however from some cause is debilitated, the parasites increase in number with rapid and progressive multiplication until they are numerous enough to cause fever; this constitutes a relapse. In support of this hypothesis he refers to the work of EHRLICH and his followers on trypanosomiasis. They found that trypanosomes in animals disappeared sometimes after the administration of certain drugs, arsenic compounds, etc. After some time however they reappeared, owing apparently to the multiplication of a few forms which had survived the action of the poison. Moreover these trypanosomes which had reappeared had developed some resistence to the drug administered.

He considers that he is justified in using a similar hypothesis to explain the obstinate resistance to quinine that is presented sometimes in relapsing malaria, especially in the clinical cases of chronic malarial infection.

D. T.

ROWLEY-LAWSON (Mary). **The Extracellular Relation of the Malarial Parasite to the Red Corpuscle, and its Method of Securing Attachment to the External Surface of the Red Corpuscle.**—*Jl. of Experimental Med.* 1913. Mar. 1. Vol. 17. No. 3. pp. 324-343. With 6 plates (one coloured).

The author states that the malarial parasite is extracellular during its entire developmental cycle; that is, with the exception of the brief periods when it is free in the blood serum, it is attached to the outside surface of the red corpuscle.

The parasite secures its attachment by means of filamentous pseudopodia thrown out for that purpose. These pseudopodia overlie the red corpuscle in the form of a loop, and these give the young parasites a ring-like appearance. The parasite squeezes up that portion of the haemoglobin substance which lies within the boundary of the loop into a mound. If the parasite is attached near the edge of the corpuscle, it is often seen to project beyond the corpuscular boundary. Numerous microphotographs are given to support these statements.

The colourless unstained area often seen within a ring parasite is not a part of the plasmodium but represents that portion of the corpuscle from which the haemoglobin has been removed by its action. The small achromatic area sometimes seen surrounding the chromatin substance in the young parasite is part of the plasmodium. This area increases in size with the growth of the parasite and sometimes can be stained a delicate blue or pink.

The author has seen no evidence to indicate that the young parasites ever conjugate.

Every point in the paper is excellently illustrated by numerous microphotographs and a good bibliography is given. [The article is a valuable one since much difference of opinion exists among distinguished observers on the subject.]

D. T.

ZIEMANN (H.). **Ueber die künstliche Weiterentwicklung (in vitro) des Tertian-Malariaparasiten.** [The Cultivation of the Tertian Malarial Parasite.]—*Deut. Med. Wochenschr.* 1913. Feb. 20. Vol. 39. No. 8. p. 373.

This note forms a postscript to the author's paper on the same subject in the *Deutsche Mediziniche Wochenschrift*, 1913. No. 6. p. 260 (see this *Bulletin*, No. 9, p. 490). Ziemann states that he found sporulating parasites in his benign tertian malaria cultures, after 34 to 36 hours' incubation. This indicates very rapid growth and requires explanation, since the time required in the living patient is 48 hours.

D. T.

POUMEYRAC. **Accès Pernicieux Palustre à Forme Pulmonaire.** [Clinique d'Outre-Mer.]—*Ann. d'Hyg. et Méd. Colon.* 1912. Oct.-Nov.-Dec. Vol. 15. No. 4. pp. 864-865.

The author describes an attack of malignant tertian malaria causing pulmonary symptoms in a soldier. Parasites were found in the blood, temp. 40·2° C. There was very severe dyspnoea with cyanosis of the face, and auscultation indicated marked pulmonary congestion. Quinine was given hypodermically; next day the temperature was normal and the signs of lung congestion had nearly disappeared; in six days the patient was well. About one month later the patient was brought into hospital with a similar attack. The fever and the pulmonary congestion again disappeared quickly under quinine treatment.

D. T.

TREATMENT.

JOYEUX. **L'Hectine dans le Traitement du Paludisme.**—*Rev. de Méd. et d'Hyg. Trop.* 1912. Vol. 9. No. 4. pp. 227-240.

The author experimented with a drug called *"Hectine B" in the treatment of Syrian patients suffering from malaria in Upper French Guinea (West Africa). The diagnosis of malaria was undoubted, in most cases parasites being found in the blood. The drug keeps well in the tropics if not exposed to light; it is put up in ampoules for intramuscular injection. The author gives detail of twenty-one malaria cases in which he used this treatment and concludes that good results were obtained, although its effect was not so rapid as that of quinine. It is certainly inferior to the latter, but he thinks that it might be useful where quinine is not tolerated, as he obtained a good recovery with it in a case of haemoglobinuric fever. It might also be employed in chronic malaria with anaemia since it acts as a general tonic.

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* **Hectine is Sodii Benzo-Sulpho-*p*-aminophenylarsonas.**

D. T.

WEBB (A. L. A.). **Notes of some Experiments made to Determine the Rate of Absorbability and Intensity of Action of Quinine given Hypodermically and by the Mouth, as shown by the Minimum-Lethal-Dose Method.**—*Jl. R. Army Med. Corps.* 1913. Mar. Vol. 20. No. 3. pp. 280-285.

The author attempted to confirm the experiments of MACGILCHRIST regarding the rate of absorption of quinine salts. The latter observer from experiments on guinea-pigs concluded that the lethality and therefore the absorbability of quinine was most rapid in the following order.

(1) Subcutaneous injection in extreme dilution (1-50);
(2) Oral administration during fasting;
(3) Oral administration with or soon after food;
(4) Subcutaneous injection in the strengths generally used for hypodermic injections (1-2 and 1-8).

The author in his experiments used monkeys instead of guinea-pigs. He found that with injections of 1-8 dilutions of quinine sulphate the minimum lethal dose for monkeys was between 0·2 and 0·25 grammes per kilo of the animal's weight. The results obtained with 1-5, 1-3 and 1-2 dilutions were very nearly the same as those with the 1-8 dilutions. All injections were given in the flank behind the shoulder. Such doses given by the mouth produced little effect and even doses equal to 0·4 grammes per kilo of the body weight did not even give a severe reaction when given orally. Administration by the mouth was performed by inserting a small wooden gag and then injecting the dose into the back of the fauces with an ordinary glass syringe.

It is concluded from the tables of experiments that the mode of administration giving the quickest action and the best absorption of quinine in monkeys is as follows, commencing with the most efficacious:—

(1) Injections of 1-8 dilutions
(2) ,, 1-5 ,,
(3) ,, 1-3 ,,
(4) ,, 1-2 ,,
(5) Oral administration with or without fasting

He does not agree therefore with MACGILCHRIST's statement that "subcutaneous and intramuscular injections in solutions of the usual strength (1-2 to 1-8) are inferior to quinine by the mouth in rapidity of action and thoroughness of absorption"; but concludes on the contrary that the drug in such dilutions, whether given by intramuscular or hypodermic injection, is more efficacious in malaria than if given by the mouth.

D. T.

Waters (E. E.). The Value of Amorphous Cinchona Alkaloid in Malaria.—*Indian Med. Gaz.* 1913. Mar. Vol. 48. No. 3. pp. 89-91. With 13 charts.

The author describes (with charts) a number of malaria cases which he treated with the " amorphous alkaloid " found in cinchona bark and another series of cases which he treated with " cinchona febrifuge." " Cinchona febrifuge " is a mixture of all the substances contained in cinchona bark, and contains four alkaloids, quinine, cinchonidine, cinchonine and quinidine. There is also a fifth substance which is called " amorphous alkaloid " and has been stated by Prain to be much more effective than even pure crystallized quinine. An average of sixteen grains of the " amorphous alkaloid " was sufficient to stop the fever of malaria in a series of 62 cases. The fall of temperature was very prompt even though the fever had persisted for some days before this treatment. Similar experiments with quinine salts showed that 45 grains of quinine sulphate were necessary to stop the fever in three days, and so it is concluded that the amorphous alkaloid is three to five times as effectual as quinine sulphate.

The " amorphous alkaloid " has no unpleasant effects; it can be given in small tablets, and is rapidly effective as well as inexpensive (four rupees per pound).

In the series of cases treated with " cinchona febrifuge " it was noted that 30 to 40 grains were necessary to stop the fever.

D. T.

Memmi (G.) & Cantieri (C.). Il "606" nella Cura della Malaria. Studio Critico e Osservazioni Personali. [" 606 " in the Treatment of Malaria.]—*Riv. Crit. Clin. Med.* 1913. Jan. 4. Vol. 14. No. 1. pp. 1-8; Jan. 11. No. 2. pp. 17-25; Jan. 18. No. 3. pp. 33-41; Jan. 25. No. 4. pp. 49-59. With 10 charts.

The authors give a very careful and full account of ten cases of malaria which they treated with intramuscular injections of " 606." Eight of the cases were aestivo-autumnal malaria and two were benign tertian; six were relapses (one benign tertian and five aestivo-autumnal). Three were primary infections and one doubtful; one of these was benign tertian.

The injections of " 606 " were made either during the period of apyrexia or during fever, at the height or fall, and no inconvenience whatever was produced. Each had a single dose of from 0·3-0·6 gm.

Their conclusions regarding the action of the drug in these cases are as follows:—

(1) It was insufficient to check the attack of fever in nearly all the cases and it did not prevent relapses.
(2) It did not show any parasiticidal action in malaria.
(3) The general condition of the patients did not benefit to any extent under the treatment.
(4) The injection of " 606 " did not give good results in their cases even when small doses of quinine (0·5 grammes) were given in addition.

D. T.

MOSQUITO PROPHYLAXIS.

NICHOLLS (Lucius). **Some Observations on the Bionomics and Breeding-places of Anopheles in Saint Lucia, British West Indies.** —*Bull. Entom. Research.* 1912. Nov. Vol. 3. Pt. 3. pp. 251-267. With 4 plates.

The author describes the natural features of St. Lucia, and goes on to discuss the developmental stages of *Anopheles argyrotarsis* and *Anopheles albimanus*, which are the two principal malaria carrying mosquitoes in that island. He points out that the larvae of these are subject to a number of diseases due to protozoa (chiefly Vorticellidae). These diseases alter the appearance of the larvae very much, causing loss of hairs, etc. If a diseased larva survives, a long time will be taken for its development. On two occasions from a large number of diseased larvae of *A. albimanus* he obtained two small stunted adults after 28 and 33 days respectively. The colour and markings on the larvae also vary according to the nature of the pools in which they are found.

The length of the life cycle of these mosquitoes depends on the nature of the breeding ground. In unfavourable conditions the period required for their development is longer than when the conditions are favourable.

	Under favourable conditions.	Maximum under unfavourable conditions.
Egg stage... ...	1½-2 days	2½ ? days
Larval period ...	11-14 ,,	31 or more days
Pupal period ...	2 ,,	2½ ? days
Total	14½-18 ,,	36 or more days

The length of life of the imago is very difficult to determine; but probably there are very few which exist for more than six weeks. A fortnight is the average length of life in moderate-sized cages, with an abundant food supply. This does not include males which rarely live for a week.

With regard to general bionomics, he points out that a great struggle for existence goes on among these larvae in pools, depending on the amount of food supply and the presence of natural enemies in the pools. He found that the conditions in pools changed greatly during the year. Diseases caused by protozoa and algae were most prevalent in non-permanent pools of stagnant water which had lasted over ten weeks; less or absent in permanent pools of water. The female anophelines appear to have some power of selecting the most favourable pools for depositing their ova. The methods for ascertaining the distribution of larvae, the classification of breeding grounds and the effect of rainfall on the number of anophelines are described.

In conclusion, the author believes that all efforts directed to mosquito reduction should be founded, not on generalisations which show theoretically where the insects ought to breed, but upon knowledge of their breeding grounds obtained by a prolonged and thorough study of all collections of water which are formed during the year. He also shows the necessity for carrying out examinations throughout the year. If anti-mosquito measures be started without first making a study of the breeding places, the efforts may be useless and in some cases even harmful.

D. T.

LEGENDRE (J.). **Destruction des Culicides a l'Aide du Filet.**—*Bull. Soc. Path. Exot.* 1913. Jan. Vol. 6. No. 1. pp. 43-47.

The author describes the value of a net (resembling a butterfly net) in keeping human dwellings free from mosquitoes, thereby rendering them more comfortable to the occupants. A native can be taught easily to use this net effectively. He gives an account of four experiments, in which he liberated a certain number of mosquitoes in a house. The windows and doors were closed and a native with the net was sent in to capture them. Thirty minutes were required for this in the first experiment. In experiment (2) 360 culices were caught in 40 minutes. In experiment (3) 376 mosquitoes were captured in 50 minutes and not one could be found in the dwelling after this time; and in experiment (4) 137 were caught in 35 minutes. The arming of natives with such nets would contribute very materially to the prevention of diseases transmitted by mosquitoes. The method is very valuable in freeing dwellings, occupied by yellow fever cases, of *Stegomyia fasciata,* especially large dwellings with large openings to the exterior, where chemical fumigation is very difficult; and it possesses an advantage over the fumigation method in that it is not necessary to remove the patient.

D. T.

ORENSTEIN (A. J.). **Mosquito Catching in Dwellings in the Prophylaxis of Malaria.**—*Amer. Jl. Public Health.* 1913. Feb. Vol. 3. No. 2. pp. 106-110.

Mosquito-catching by hand within dwellings is a measure of great value in the prophylaxis of malaria. It is especially applicable to temporary camps.

This measure is adopted in the Panama Canal Zone in places where there are temporary camps and the expense of drainage, &c., would be prohibitive. In one instance it reduced the malaria rate from 14 per cent. a week to about 0·3 per cent. per week. At the Monte Lirio camp in the Canal Zone this is about the only measure relied upon to keep down the malaria rate; yet it reduced this to a point as low as that in other parts of the Zone, where the breeding places of anophelines are destroyed.

The mosquitoes are caught by trained negroes in "chloroform tubes" such as are used by entomologists. They are also killed by means of a "slapper" made of a six-inch square of white gauze attached to a two-foot stick. If the dwellings are screened, the catching should be done early in the morning and in the evening. If the dwellings are not screened and the anophelines are abundant, a search for anophelines should be made four or five times a day.

In order that the catching may be efficiently done, it is necessary to have the dwellings well lighted and the walls painted a light colour or whitewashed. In dark dwellings some form of portable illumination should be used. In screened buildings hand catching may be supplemented by properly designed and installed mosquito traps.

D. T.

UNCLASSED.

LALOR (N. P. O'Gorman). **A Teleological Working Theory of the Asymbiotic Relations of the Malarial Plasmodium to its Alternative Hosts—Man and the Anopheles Mosquito.**—*Indian Med. Gaz.* 1913. Feb. Vol. 48. No. 2. pp. 52-54.

The author believes that he has discovered a law which explains the periodicity and other phenomena of the prevalence of malaria. It is that "the viability of a parasite through its life stages in an insect host is the result of an asymbiotic relation between the individual parasite and the individual host, the terms of which are those of their relative vital potential. If the relative vital potential of the parasite is too high the host dies; if the relative vital potential of the host is too high the parasite is destroyed." For the details of his argument the paper must be consulted.

D. T.

CAJOZZO (G.). **Ossido di Carbonio e Malaria.** [Carbon Dioxide and Malaria.]—*Gazz. d. Ospedali e d. Cliniche.* 1913. Jan. 16. Vol. 34. No. 7. pp. 65-67.

The author believes that the malarial parasite can only attack a person in whom the functional activity of the red blood corpuscles is disturbed. Amongst the agents which can disturb the red corpuscles he places carbonic acid gas produced by vegetable decomposition in fertile malarial districts. [The author brings forward no scientific observations in support of his contention.]

D. T.

SLEEPING SICKNESS.

THE TRYPANOSOME OF MAN IN RHODESIA AND NEIGHBOURING REGIONS.

BECK & WECK. **Die menschliche Trypanosomen-Krankheit am Rovuma in Deutsch-Ostafrika.** [Human Trypanosomiasis on the Rovuma in German East Africa.]—*Arch. f. Schiffs. u. Trop.-Hyg.* 1913. Mar. Vol. 17. No. 5. pp. 145-160.

In July and August, 1911, a number of sudden deaths were reported from a village on the Sassawara river in the Ssongea district of German East Africa; this district marches on the south with Portuguese East Africa, the Sassawara draining to the Rovuma. A large number of blood smears were sent to the laboratory at Daressalam and trypanosomes were found in the blood from two women. The authors were therefore sent to investigate. On repeated examination of the inhabitants of the village, 110 in number, they found trypanosomes in the blood of four, one of whom was a girl who appeared to be in good health. They looked carefully for *Glossina palpalis* in the neighbourhood; this species was not present, but *Glossina morsitans* was very common. In a neighbouring village they found four other cases of trypanosome infection and at a place six days' march away they found others. Enlargement of the glands was unusual in these villages. Here again *Glossina morsitans* was common and *palpalis* was absent. Between November 1911 and September 1912 twenty cases in all were found near the Rovuma river, one of which came from Lake Nyasa. Twelve of these were collected in a camp and treated with atoxyl; eight are now dead, three of whom were not treated. Nine patients are now under treatment. In the great majority trypanosomes could be driven only temporarily out of the blood by atoxyl treatment, which was carried out according to KOCH's method. The blood was examined at least twice a week in thick films. It was found that as a rule the trypanosomes reappeared one or two days after an injection. In some patients trypanosomes were fairly numerous, but in the greater number they were very few, sometimes only one being found in the whole preparation. No slide was considered negative unless it had been searched for twenty minutes.

The clinical picture of the disease varied considerably; some patients had no symptoms at all; somnolence was seen in one patient in the last eight days of life. Details follow of each case. Some account is given of the morphology of the parasites. Inoculation experiments were made with several species of animals; it was noticed that in all the incubation period was short. It was observed that the trypanosomes in the blood and organs, especially the lungs, liver, and heart, in dogs, rats, and monkeys often differed considerably from the forms in man; the difference appears to have consisted in the presence of stumpy forms with the blepharoplast near the nucleus. They never observed these organellae transposed. They consider that in their morphological and biological properties the trypanosome in these cases differs both from *T. gambiense* and *T. rhodesiense* and they suggest the name *Trypanosoma rovumense.* [TAUTE has shown that this trypanosome corresponds with *T. rhodesiense* (this *Bulletin*, No. 9, p. 513.] They think that, owing to the small number of cases, the disease is not likely to spread or to be introduced into other districts.

With regard to preventive measures, if the number of cases increases it will be necessary to move the villages into a fly-free district. Clearing is impossible because the fly is so widely spread. They recommend regular visits to the infected and suspected districts for the detection of the sick and carriers; collecting of these in a camp and treatment of them with atoxyl; the setting up of control stations for the examination of caravans going to or from the coast; and the reporting of deaths in the affected district.

A. G. B.

i. FLEMING (A. M.). **Report on the Fly Area and the Outbreak of Trypanosomiasis in the Sebungwe District.**

ii. MAY (A.). **Sleeping Sickness in the Luangwa Valley.**

Reports to the British South Africa Company. [MSS.]

i. On August 1st, 1912 it became known that human trypanosomiasis was present in Southern Rhodesia, a European from the Sebungwe District having been found in England to be infected. The author, Dr. F. O. STOHR, and Mr. JACK visited the region in question. An account is here given of their investigations. The distribution of tsetse fly is detailed and discussed. An account is given of the cases of infection discovered; these now number twelve. The natives within the fly belt have no cattle, few dogs, and only small herds of sheep and goats; a certain percentage of these was found to be infected with trypanosomes. Rabbits were inoculated with a human strain, a dog strain, and a goat strain, and were forwarded to Mr. BEVAN. All the persons found to be infected had resided in, or recently visited the Busi river, a tributary of the Sengwe. The number of infections is considered small in comparison with the total native population, who are freely bitten by fly. Evidence of natives is given as to the date of infection of man, whether recent or remote. The natives in the infected area are to be moved. The author thinks that, if the money could be found, the best method of dealing with the district would be by systematic deforestation from without inwards, by breaking up large tracts of ground, and the cultivation of sugar, cotton, and other products. The conclusions arrived at were as follows—

"1. That trypanosomiasis in men undoubtedly exists in the Sebungwe District.

"2. That the infection is small in relation to the population.

"3. That the area of infection would appear to be limited to certain villages along the banks of the Busi River.

"4. That whether we are dealing with *Trypanosoma rhodesiense* or *Trypanosoma gambiense* or some new trypanosome is still unproved.

"5. That though fly sickness in stock has been known for many years, infection of man would appear to be of comparatively recent origin.

"6. That in order to prevent the further spread of trypanosomiasis in man within this area, or the infection of adjacent fly belts in Southern Rhodesia, the wholesale depopulation of this fly belt is advisable.

"7. That the policy to be adopted in dealing with this depopulated area in the present state of our knowledge must be guided largely by financial considerations.

"8. That unless steps are taken to prevent the spread of the fly it will probably, given favourable conditions, spread beyond its present boundaries."

ii. MAY has recently re-examined the population on and near the Luangwa river, Northern Rhodesia. His report is dated December 13th, 1912. His object was to compare the results with those of similar examinations in 1910 and 1911. 66 villages were visited and 3,340 people seen. The total result was that fewer cases were found than in 1910, nine as against ten. The adult death rate was calculated at 28 per thousand, but most of the deaths could be attributed to causes other than trypanosomiasis. The author thinks that the trypanosomiasis death rate may be put at 8 per thousand and that there is nothing to show that the disease has spread or shows even a tendency to become epidemic. He thinks that the present restrictions in this area can shortly be modified with safety.

A. G. B.

SHIRCORE (J. O.). **Nyasaland Trypanosome Fever.**—*Trans. Soc. Trop. Med. & Hyg.* 1913. Feb. Vol. 6. No. 4. pp. 131-142. With 2 charts.

In this paper a full account is given of the symptoms of human trypanosomiasis in Nyasaland (cf. *Sleeping Sickness Bulletin*, Vol. 4, p. 262). It is noted that the tendency to sleep at odd hours is not common, but a typical somnolent stage of some three weeks has been recorded in three instances. Whereas gland enlargement in the posterior triangles may or may not be present, the epitrochlears are almost invariably palpable and sometimes puncturable. This enlargement was absent in only one of 21 cases. Interstitial keratitis was present in five out of 29 cases. The changes in the blood were studied in twelve cases; the red blood cells were found to be between 3,300,000 and 3,500,000 per cmm.; the haemoglobin varied between 35 and 40 per cent.; the colour index in two cases was about 0·5; the white corpuscles were between 7,000 and 12,000 per cmm. The lymphocytes were increased at the expense of the polymorphonuclears except in the last stages or even earlier. The large mononuclears were between 10 and 14 per cent. Oedema of the glottis and lungs is noted as not uncommon. The average duration of the disease was found to be four and a half months; a duration of six months was exceptional. The author attaches much importance to the examination of fresh coverslip preparations of blood. He found that when trypanosomes had been once observed they were invariably found at every subsequent examination. He concludes that the trypanosomes are always present and especially so during the last month.

He differentiates the disease in Nyasaland from the acute form in Uganda by the facts that in Nyasaland there is nearly always a very definite and unusually severe onset; the diagnostic value of the glands in the posterior triangles is practically nil; a large percentage of the cases show interstitial keratitis; and in 27 cases examined trypanosomes were found in the peripheral blood whenever looked for. With regard to prognosis he says that the first well-defined diminution in the frequency of the pulse rate indicates that the case is on its downward course and that the vital resistance has been overcome. A table is given showing the state of the posterior cervical glands and the epitrochlears in 21 cases; glands were palpable in 66·6 per cent. in the posterior triangles, in 95·23 per cent. in the epitrochlear region. As a result of the examination of one hundred healthy persons for enlargement of the epitrochlears it was found that they were palpable in 47 per cent.

Of the charts appended one shows a regular intermittent temperature, the other a less regular type.

[The acute inflammatory swelling of the skin of the neck, described by STANNUS and by SANDERSON, appears to be met with in Europeans and only seldom in natives.]

A. G. B.

HEARSEY (H.). *Nyasaland Sleeping Sickness Diary.* 1912. Dec. 31. Part 19. 6 pp.

During the quarter, October to December 1912, fifteen additional cases of sleeping sickness were reported, fourteen in the Sleeping Sickness Area and one from the Marimba district. This makes a total of 108 cases. There follows an account of most of the fresh cases; seven were dead at the date of the Report. Clearings have been made round all the villages in the proclaimed area and SHIRCORE has reported that they have been markedly successful in banishing the flies. During eight months' investigations in adjoining districts only one case of infection has been found, but the author thinks that such cases probably exist.

A. G. B.

STEPHENS (J. W. W.) & FANTHAM (H. B.). **Further Measurements of *Trypanosoma rhodesiense* and *T. gambiense*.**—*Ann. Trop. Med. & Parasit.* 1913. Mar. 31. Vol. 7. No. 1. pp. 27-39.

In the present series of measurements the authors have measured, always from a single animal, a rat, 100 trypanosomes each day for the first ten days of the infection. In answer to criticisms of their modification of BRUCE's method they say that it is suitable for use in the laboratory, if not in the wilds, and is acknowledged to be more accurate. They give first a detailed table of measurements of *T. rhodesiense,* 1,000 non-dividing individuals, then a summary of these measurements, and a table which is compiled from them.

Table III.—*T. rhodesiense,* in which the trypanosomes are arranged in Bruce's three groups (a) 13-21μ; (b) 22-24μ; (c) 25μ and upwards.

Day.	1	2	3	4	5	6	7	8	9	10	Totals.
Stumpy, 13–21μ ...	12	41	37	45	17	16	53	15	9	8	253
Intermediate, 22–24μ	25	19	40	28	31	40	29	18	16	21	267
Long, 25–36μ ...	63	40	23	27	52	44	18	67	75	71	480
	100	100	100	100	100	100	100	100	100	100	1,000

This table shows clearly the great variations in the figures for each group on particular days, which makes it obvious that when a sample is taken at random from an animal on any day an erratic factor is introduced. The distribution by percentages in respect to length of the 1,000 non-dividing trypanosomes is expressed in a curve.

Corresponding tables are then given for *T. gambiense.*

Graphical representation of the distribution of the lengths of 1,000 *T. gambiense* from one rat, and of 1,000 *T. rhodesiense* from one rat.

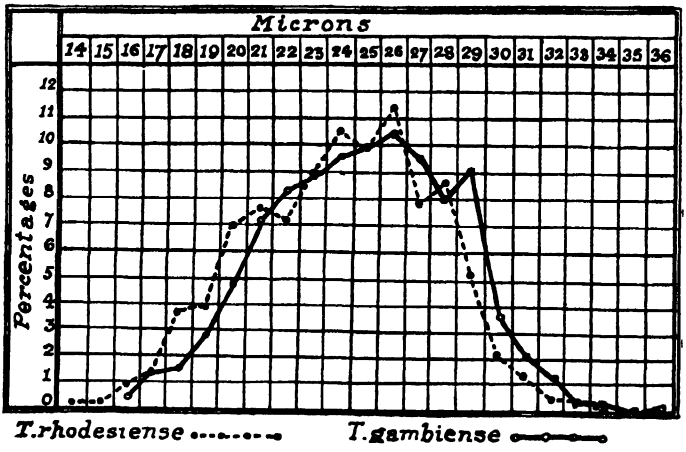

Table VI.—*T. gambiense,* in which the trypanosomes are arranged in Bruce's three groups.

Day.	1	2	3	4	5	6	7	8	9	10	Totals.
Stumpy, 13–21μ ...	17	1	25	10	23	29	57	6	5	9	182
Intermediate, 22–24μ	40	16	29	23	33	49	33	15	20	12	270
Long, 25–36 μ ...	43	83	46	67	44	22	10	79	75	79	548
	100	100	100	100	100	100	100	100	100	100	1,000

Here is noted a similar variation in the figures for each group. There follows a curve for *T. gambiense.*

T. gambiense and *T. rhodesiense* are then compared in three tables, one of which is here reproduced.

Table VIII.—Comparison of distribution of the trypanosomes according to Bruce's groups.

——	13–21μ.	22–24μ.	25μ and upwards.
T. gambiense...	18·2 %	27·0 %	54·8 %
T. rhodesiense	25·3 %	26·7 %	48·0 %

The average length of the specimens of *T. rhodesiense* measured was 24·12μ, of *T. gambiense* 24·87μ.

The difference of opinion as to procedure and the different results obtained are attributed to the fact that these trypanosomes are dimorphic; such difficulties probably do not arise in the case of a monomorphic trypanosome. The size of the sample is discussed; it is considered that one of 100 is fairly reliable when trypanosomes are plentiful in the blood. The day of infection in an acute trypanosomiasis is very important in determining whether the trypanosomes are short or long, as reference to Table III or VI will show. It is noted that there is a fair correspondence between the curves of Bruce and others and those of the authors, but none between those of Kinghorn and Yorke and the authors'. They believe that these differences must be due to difference of method, but they note also the possibility that trypanosomes direct from the natural vertebrate hosts or the fly have a different character from those that have been maintained in laboratory animals. The authors' results for *T. rhodesiense* are in accord with their previous measurements (*Sleeping Sickness Bulletin*, Vol. 4, p. 257) and show the consistency of their method. The conclusion is as follows—

> "We must admit that we had hoped to be able to distinguish between the two species, *T. rhodesiense* and *T. gambiense*, by measuring one thousand specimens of each organism. Though these biometric results are not sufficiently conclusive, we think that it is generally admitted that the two species are distinct.
>
> "Microscopically, the two trypanosomes are indistinguishable except by the posterior nuclear character of *T. rhodesiense*. We believe that a curve only expresses graphically what the eye can appreciate under the microscope, and that if two trypanosomes cannot be distinguished microscopically, we shall not be able to do so by measuring them. However, provided that further experience enables observers to agree as to the best procedure, it is no doubt a great advantage to have a correct graphical expression for what is otherwise only an impression, although it may be a quite accurate one. Further, these measurements should not be regarded as useless, as they will undoubtedly form the basis (provided all the protocols are given) for a critical statistical investigation in the future."

A. G. B.

Bruce (David), Harvey (David), Hamerton (A. E.), & Lady Bruce.—**Morphology of Various Strains of the Trypanosome causing Disease in Man in Nyasaland. I. The Human Strain.**—*Proc. Roy. Soc.* 1913. Apr. 7. Series B. Vol. 86. No. B 587. pp. 285-302.

The object of the paper was "to study as many individual strains as possible" in order to gain "a general idea of this important species of trypanosome." Five human strains have been studied, four from natives in the sleeping sickness area, Nyasaland, the fifth from an European who contracted the disease in Portuguese East Africa. No difference can be made out in regard to the general morphology on comparing the five strains. "The same posterior nuclear and blunt ended forms are present in all."

The five strains were compared biometrically, and the results set forth in the following table:—

Table XVII.—Measurements of the Length of the Trypanosomes of the five Human Strains. The trypanosomes have been taken from various animals.

Date.	Strain.	Name.	Number of trypanosomes.	Animals.	In microns.		
					Average length.	Maximum length.	Minimum length.
1912 ...	I	Mkanyanga	1220	Various	24·1	36·0	14·0
1912 ...	II	E———	1500	"	22·2	36·0	15·0
1912 ...	III	Chituluka	1500	"	26·1	38·0	15·0
1912 ...	IV	Chipochola	1000	"	22·5	34·0	15·0
1912 ...	V	Chibibi ...	1000	"	22·4	37·0	15·0
			6220		23·5	38·0	14·0

The various animals used for inoculation were the goat, monkey, dog, rat and sometimes the sheep.

The "difference in average length may be due to slight variations having taken place in the different strains, resulting from the passage through more or less resistant man. There is no evidence that this variation is due to treatment by atoxyl or other drugs. It has been shown that the same strain grown in two animals of the same species [*e.g.*, rats] gives like results."

Table XVIII.—Measurements of the Length of the Trypanosomes of the Five Human Strains. The trypanosomes have been taken from the rat alone.

Date.	Strain.	Name.	Number of trypanosomes.	Animal.	In microns.		
					Average length.	Maximum length.	Minimum length.
1912 ...	I	Mkanyanga	600	Rat	25·1	35·0	16·0
1912 ...	II	E———	1000	"	23·1	32·0	17·0
1912 ...	III	Chituluka	1000	"	26·4	38·0	15·0
1912 ...	IV	Chipochola	500	"	22·5	34·0	15·0
1912 ...	V	Chibibi ...	500	"	24·0	32·0	18·0
			3600		24·2	38 0	15·0

The five curves of measurements of the strains prepared by the authors were compared with each other and with the curves of

T. rhodesiense given by **Stephens** and **Fantham** (*Sleeping Sickness Bulletin*, Vol. 4, p. 261) and **Kinghorn** and **Yorke** (*loc. cit.*, p. 170). Curves I. and III. were alike and coincided with that prepared by **Stephens** and **Fantham** from the case of Armstrong in Liverpool, whereas Curves II., IV. and V., approached more to the type described by **Kinghorn** and **Yorke** from the Luangwa Valley.

The percentages of posterior nuclear forms found in the trypanosome of the human strain is set forth in the following table:—

Table XX.—Comparison of the Percentages of Posterior-Nuclear Forms found among the Short and Stumpy Varieties of the Trypanosome of the Human Strain.

Experiment No.	Strain.	Name.	Animal.	Percentage among short and stumpy forms.
—	I	Mkanyanga ...	Rat ...	34·1
728	II	E———	" ...	9·3
953	III	Chituluka... ...	" ...	10·3
1337	IV	Chipochola ...	" ...	3·3
1660	V	Chibibi	" ...	32·0
			Average ...	17·8

The authors' conclusions are as follows:—

"1. The five human strains of this trypanosome, isolated from four natives in Nyasaland and one European in Portuguese East Africa, belong to the same species.

"2. This species is *T. rhodesiense* (Stephens and Fantham).

"3. Evidence is accumulating that *T. rhodesiense* and *T. brucei* (Plimmer and Bradford) are identical."

H. B. Fantham.

Blacklock (B.). A Study of the Posterior Nuclear Forms of *Trypanosoma rhodesiense* (Stephens and Fantham) in Rats.—*Ann. Trop. Med. & Parasit.* 1913. Mar. 31. Vol. 7. No. 1. pp. 101-112.

The author reviews the work done on trypanosomes showing posterior nuclear forms. His own experiments were made on rats, arranged in four groups of six each, all inoculated from a guinea-pig infected with *T. rhodesiense*. The number of parasites inoculated was estimated at one million, four millions and eight millions. "No definite variation in either incubation or duration could be attributed to the relative numbers of trypanosomes injected."

The blood of the animals was examined daily. "The first trypanosomes which appeared in the peripheral blood of each rat were of the long and slender, or intermediate types. • Subsequently, short forms made their appearance, and after a few days posterior nuclear forms." The forms showing the nucleus quite posterior appeared last.

Blacklock states that "posterior nuclear forms were found in all cases in the preliminary count," thus showing the constancy of this feature in the strain.

The author discusses the significance of the posterior nuclear forms in *T. rhodesiense*.

His conclusions are:—

"1. Posterior nuclear forms first appear in the blood of rats infected with *T. rhodesiense* from the sixth to the tenth day of the disease, taking a count of a thousand trypanosomes.

"2. They increase in numbers in the later stage of the disease.

"3. They increase relatively to other forms of trypanosome.

"4. They cannot be explained as the result of either faulty technique or degeneration.

"5. They show definite powers of resistance to disintegration in the cadaver of the animal host.

"6. The presence of posterior nuclear forms may be due to:—

- "(*a*) The occurrence of such forms as a constant constituent of certain strains.
- "(*b*) A mixed infection.
- "(*c*) Certain unexplained influences in the blood environment, affecting the parasites.
- "(*d*) The transmitting agent.

"7. There are, at present, stronger arguments against the last three explanations of their presence than against the first."

H. B. F.

TRYPANOSOMA BRUCEI.

STEPHENS (J. W. W.) & BLACKLOCK (B.). **On the Non-identity of *Trypanosoma brucei*, Plimmer and Bradford, 1899, with the Trypanosome of the Same Name from the Uganda Ox.**—*Proc. Roy. Soc.* 1913. Mar. 6.. Series B. Vol. 86. No. B 586. pp. 187-191.

The authors review briefly the statements regarding the morphology of *Trypanosoma brucei* made by:—BRUCE (? 1896) in his report on the Tsetse-fly Disease or Nagana in Zululand; KANTHACK, DURHAM and BLANDFORD (1898); and PLIMMER and BRADFORD (1900, 1902). These statements as well as the figures and photographs available show that *T. brucei* is practically monomorphic, very few trypanosomes being at all stumpy.

Next the authors analyse the paper of BRUCE and his collaborators (1911), who compared *T. brucei* from Uganda with *T. brucei* from Zululand, and came to the conclusion that the strains were the same. Then the article of LAVERAN (1911) on the identification and classification of mammalian trypanosomes is analysed. Laveran placed *T. brucei* in a group which always showed a free portion to its flagellum, in contrast with *T. gambiense*.

Finally, Stephens and Blacklock examined the strains maintained at the laboratories of the Liverpool School of Tropical Medicine and derived from (1) the Zululand strain of KANTHACK, DURHAM and BLANDFORD, and PLIMMER and BRADFORD, and (2) the Uganda strain of BRUCE. The authors state that:—

(*a*) "The Zululand strain is *typically monomorphic*. The trypanosomes are long, with a long free flagellum." LAVERAN'S strain of *T. brucei*, derived from EHRLICH, was also verified as monomorphic. Further, the Zululand strain as seen in old slides lent by NUTTALL, SKINNER, and PLIMMER, was found to be monomorphic.

(*b*) "The Uganda strain, on the contrary, is *typically dimorphic*, i.e., besides the usual long forms of trypanosomes, stumpy forms are readily found, even in abundance occasionally, when the infection is well marked." BRUCE (1912) states that this trypanosome has 26 per cent. of non-flagellated forms.

Stephens and Blacklock write "that it is impossible to match a typical Uganda slide by any slide from the Zululand strain."

MESNIL remarked that the Uganda strain maintained in mice showed very few stumpy forms, but MESNIL'S strain reinoculated into guinea-pigs showed many stumpy forms. The Zululand strain, on the other hand, is monomorphic in guinea-pigs, rats and rabbits.

The authors consider that the preceding results may be explained by one or other of three possibilities:—

(1) The possibility of confusing the strain during the course of inoculations extending over years. This, however, seems untenable.

(2) That the strain examined by BRUCE in Zululand may not have been the same as that sent to England. This may be possible.

(3) "That the strain originally sent to England was dimorphic, but that it has now become monomorphic." The dimorphic strain might be a mixture of long and stumpy trypanosomes, and the stumpy forms have now died out.

The authors cannot decide definitely between these views.

In conclusion they write:—

> "We come back, therefore, to the fact of which we ourselves have no doubt, viz., that the trypanosome that Plimmer and Bradford worked with, and which they named *T. brucei* in 1899, is certainly now a monomorphic trypanosome, and is not the same as the trypanosome from the ox described under the same name by Bruce and others in Uganda.
>
> "We believe, then, that the facts we have brought forward prove the non-identity of the Zululand and Uganda strains.
>
> "In order to avoid confusion, we think it advisable that this Uganda trypanosome should be re-named. We therefore propose for it the name *T. ugandae*."

H. B. F.

TREATMENT.

RANKEN (H. S.). A Preliminary Report on the Treatment of Human Trypanosomiasis and Yaws with Metallic Antimony.—*Proc. Roy. Soc.* 1913. Mar. 6. Series B. Vol. 86. No. B 586. pp. 203-215.

The use of precipitated metallic antimony, in a state of finest division, was devised by PLIMMER for the treatment of trypanosomiasis. The results of experiments on infected animals with this substance have appeared at various times in the *Sleeping Sickness Bulletin* (*e.g.*, Vol. 3, p. 18). The metal is given intravenously and causes no irritation of the tissues. It was first used in cases of sleeping sickness by R. J. C. THOMPSON at the Yei sleeping sickness camp, but the cases were not fully investigated. The author's series of cases was treated by him at Yei in the Lado Enclave since October 1911. During the past year 76 newly admitted cases have been treated with antimony, either alone or combined with salvarsan or atoxyl, and shorter courses of antimony have been given to 143 old cases previously treated with atoxyl and other substances. Over 1,400 intravenous injections have been given; amongst the first 150 three deaths occurred which were probably due to the treatment.

> "The method of administration is the same as that of an ordinary intravenous injection of saline solution given hydrostatically through a needle of somewhat large bore.
>
> "The dose of antimony is stirred with about half an ounce of normal saline in a small glass mortar and becomes a temporary suspension. Two ounces of saline are then poured into the funnel and tubing, the needle is inserted into any vein in the forearm and the clip opened. As soon as it is seen that the saline is flowing freely into the vein, and there is no swelling round the site of the puncture, the suspension of antimony is poured into the funnel and the mortar is washed out, with a little more saline, into the funnel in order to leave no residue. The antimony is allowed to run into the vein, the funnel being gently shaken from time to time, and, when it is on the point of becoming empty, more saline is poured in. The window in the rubber tubing should be watched, and after all traces of antimony have passed it some more saline is allowed to run in to clear it out of the part of the tubing below the window; the clip is then closed and the needle withdrawn. About six ounces of saline seems to be a sufficient quantity, and the time occupied in giving an injection varies from three to seven minutes—depending on the calibre of the vein and the bore of the needle employed.
>
> "I have found it possible, without any hurry, to give as many as 10 injections in an hour; I mention this to show that this method of treatment is feasible on a large scale."

The usual dose was 1 grain. The author thinks that in selected cases one and a half or even two grains may be safely given. Four days would seem to be the most suitable interval between doses; they have frequently been repeated on the third day. The usual course of treatment was five doses at intervals of four days, with a short course of three doses extending over nine days after an interval of six weeks. A table shows the results of the treatment with antimony alone of 35 cases; in fifteen there were no symptoms other than enlargement of the cervical glands; seventeen had also fine tremor of the tongue. They were taken just as they came. Microscopical examination was the only available method of controlling the results. Blood and gland juice were examined in all cases by three observers, the total time of each examination being one and a half hours. Of the 35 cases four are dead, two have deserted, five have relapsed, and the remaining 24 are improved, microscopic examination being negative up to the date of writing. Two only of the four deaths could be connected directly with the treatment. Two of the patients who relapsed were very susceptible to antimony and were unable to take doses at shorter intervals than a week. Of the 24 improved cases it is thought that probably some will relapse; they are at present being kept without further treatment.

Ten cases were treated by antimony and salvarsan; eight have shown definite improvement. Thirty-one patients have been treated by antimony and atoxyl, in such a way that they had continuous treatment for rather more than three months. It is too early to speak of the results.

Some patients have a high degree of susceptibility to these injections. The following symptoms may be seen in ordinary patients—fever (*réaction thermique*); soft pulse (fall in blood pressure); diuresis; cough, lasting as a rule five or ten minutes, rarely twelve hours or more; pain in the xiphisternal region, most severe the next day; and headache. The following symptoms have occurred in people who are very susceptible—sickness and vomiting (six times); fainting (once); meteorism (once); herpes (seven times); stomatitis (twice).

The temperatures were taken in over 100 cases at short intervals after an injection, and morning and evening for three days. From the results the conclusion was drawn that the fever is not caused by trypanolysis, that the initial rise may be due to antimony, but the later rises are probably due to the saline solution.

Observations made to determine the time required for an intravenous injection of antimony to clear the glands of trypanosomes showed this to be twenty minutes.

The rest of the paper deals with the successful treatment of yaws by the same method.

[The author does not state how long his cases were under observation after treatment. This information will doubtless be given in the later report.]

A. G. B.

GAMBLE (Mercier). **Sleeping Sickness in the Portuguese Congo: Apparent Cures.**—*Jl. Trop. Med. & Hyg.* 1913. Mar. 15. Vol. 16. No. 6. pp. 81-84.

Between December 1908 and August 1909 the author had 41 unselected native patients under treatment for trypanosomiasis, the parasites having been found, by gland puncture, in each case. The main treatment consisted in the administration of 100 grains of atoxyl subcutaneously in the fore-arms, usually in doses of 4 grains daily. The patients submitted to treatment voluntarily and lived at their own expense. A few had treatment subsequent to August 1909. Nineteen of the 41 are alive and well. Details of each case in which recovery appears to have taken place are given, with photographs of some of the patients. It is stated that all the nineteen are living useful lives and have had good health from three and a half to four years. The method of treatment, however, takes up much time. Since October 1910 the author has given as a rule seven and a half grains of atoxyl twice a week intramuscularly. He hopes to report on these cases later.

A. G. B.

v. D. HELLEN. **Ueber den Zeitpunkt des Auftretens von Rückfällen der menschlichen Trypanosomiasis nach ihrer Behandlung mit Arsenophenylglyzin.** [The Time of Appearance of Relapses in Human Trypanosomiasis after Treatment with Arsenophenylglycin.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1913. Apr. Vol. 17. No. 7. pp. 230-242.

This is a continuation of the observations of von RAVEN and ZUPITZA, made in the sleeping sickness camp in Togoland (see *Sleeping Sickness Bulletin,* Vol. 3, p. 256 and previous references). Von RAVEN showed that the dose of arsenophenylglycin must exceed 40 mgm. per kilo. body weight and that a dose greater than 60 mgm. per kilo. causes symptoms of poisoning. Of the patients in this camp 57 treated with atoxyl and 233 with arsenophenylglycin are considered here; nearly all were at an early stage of the disease. The following table (abbreviated) shows their condition at the end of May 1912.

No. treated.	Still in camp.	Discharged as apparently well.	Time between last dose and last examination.	Relapsed.	Died of other disease.	Fate unknown.
Atoxyl, 15–20 double injections every 10th and 11th day, up to 0·5 gm. each.						
57	—	29=51 %	31–40 mths.	16=28 %	5=9 %	7=12 %
Arsenophenylglycin, two injections on successive days.						
233	58=25 %	136=58 %	9–35 mths.	29=12 %	8= 4 %	2=1 %

Another table shows the duration of observation of the 58 arsenophenylglycin treated patients still in camp. About 40 of these have been under observation between seven and ten months and are shortly to be discharged. The 136 which have already been discharged are all in apparent health. It is noted that not a single one of these had a relapse; the relapses all occurred in the camp a short time after cessation of treatment. This was not the case with atoxyl treatment, for of sixteen relapses fourteen occurred amongst discharged persons who were apparently well. Another table shows how many months the 136 discharged persons were under observation in camp. It is seen that 79 were there from nine to twelve months and 61 from thirteen to nineteen months after the arsenophenylglycin injections.

The 29 cases of relapse are divided into twenty in whom trypanosomes were found and nine whose deterioration was clinical. Since the end of 1908 regular observations have been made of the temperatures of all the patients, at first three times a day and then morning and evening. A table gives a full account of the temperature and other observations made on the above twenty cases. The author thinks that the beginning of relapse should be dated to the first day of fever after the administration of the drug if there is no other cause of a rise. In these cases the earliest relapse so detected was at fifteen days, the latest at six and one third months. In three cases it occurred in less than a month, in nine between 1 and 2 months, in six between 2 and 3 months, in one between 3 and 4 months and in one between 6 and 7; that is to say, in 95 per cent. of cases it occurred within the first four months. The longest period which elapsed between two suspicious temperatures was 141 days. Another table shows that the time of the relapse is independent of the size of the dose. The temperature, when the presence of trypanosomes was detected, varied between 37·5° and 39·0°. The author regards 37·4° as the critical temperature. If this or a higher temperature is found, the blood is microscopically examined.

The conclusions drawn are that, if one is to be sure of the results, persons treated should have their temperatures watched for at least seven months and any whose temperature rises above 37·4° without obvious cause should be kept under observation for at least five months longer.

A. G. B.

AUBERT (P.) & HECKENROTH (F.). **L'Atoxyl dans la "Prophylaxie Chimique" de la Trypanosomiase Humaine.**—*Bull. Soc. Path. Exot.* 1913. Mar. Vol. 6. No. 3. pp. 184-189.

The authors think that we should distinguish clearly between two kinds of treatment which, although the same therapeutic substances are used, differ in their object. The object of curative therapy is, by prolonged treatment, to obtain definitive cure. The natives generally refuse treatment of this kind. Prophylactic therapy, on the other hand, is a form of treatment the purpose of which is only to banish the trypanosomes from the peripheral circulation for as long a period as possible. This means a short course of treatment and is well accepted. The patients cleared of their parasites no longer form reservoirs of the virus and cease to be dangerous to the rest of the population.

In this paper observations are given of infected natives who received a varying number of injections of atoxyl and whose blood was submitted to frequent examination with the centrifuge. Of 148 persons at Carnot who received a single injection of atoxyl and were carefully examined six months later 75 per cent. showed no trypanosomes. [It is not stated whether more than one examination was made.]

Tables are given of patients who received at Brazzaville injections of atoxyl varying in number (1) from one to four, (2) from five to six, (3) from seven to fourteen. The usual dose was 1 gm. In (1) 23 patients were treated; the average period of sterilisation of the blood was six months; and the number of patients so sterilised was twelve, that is 52 per cent. [There is a slight discrepancy between this statement and the table.] In (2) nine patients were treated; the average period of sterilisation was nine months; the number of patients so sterilised was four, that is, 44 per cent. In (3) the number of patients treated was eleven; the average duration of sterilisation was thirteen months; the number of patients so sterilised was ten, that is 90 per cent. Of a total number of 194 patients treated the blood of 141 was sterilised for six months or more, that is 72 per cent.

The authors conclude that in the majority of cases prophylactic treatment, consisting of four or five atoxyl injections at the usual intervals, suffices to secure an average duration of sterilisation of eight to ten months. The treatment should be repeated. It may be carried out at medical posts or in the course of tours made by medical officers and can be applied systematically to all infected natives.

[These are striking results, but had the blood of these persons been injected into susceptible animals the percentage of sterilisations might have been less. Previous work too tends to show that apparent absence of parasites from the blood stream does not mean that the subject is non-infective to fly.]

A. G. B.

TRANSMISSION.

BRUMPT (E.). **Evolution de *Trypanosoma lewisi, duttoni, nabiasi, blanchardi,* chez les Puces et les Punaises. Transmission par les Déjections. Comparaison avec *T. cruzi*.**—*Bull. Soc. Path. Exot.* 1913. Mar. Vol. 6. No. 3. pp. 167-171.

T. lewisi is easily transmitted from rat to rat by fleas and less easily by lice. The cycle in the flea has been described by MINCHIN and THOMSON. The blood trypanosomes become transformed in the digestive tube of fleas of various species* into crithidia and sometimes into herpetomonas or leishmania. These divide actively and give origin after a variable number of days to small trypanosomes which are infective to the rat and which Brumpt proposes to call 'metacyclical' trypanosomes. As to the method by which the infection is conveyed Brumpt's transmission experiments, made with swallow fleas, agree with those of NÖLLER; he finds that transmission is effected exclusively by the dejecta or by the rectal contents of the fleas, provided they contain metacyclical trypanosomes. He has got only negative results from biting experiments when the dejecta were sterilised on the rat's skin. The small trypanosomes contained in the dejecta are in their morphology and their aptitude for penetrating mucous membranes quite different from the blood forms of *T. lewisi*. Employing the rectal contents and dejecta of five fleas which had bitten, without infecting it, a young rat still suckled by its mother, he was able to infect three of the same litter by putting some of the infected fluid in the eye, mouth, and peritoneum. Experiments made with controls, blood trypanosomes being placed in the eye, mouth and on the skin, were negative.

T. lewisi develops also in the bug, *Cimex lectularius*. In one instance he was able to infect a rat by inoculating it with the rectal contents of a bug which had become infected 38 days and again six days before. He states that there was certainly a cyclical development in this bug. With regard to the observations of PATTON and WENYON on Leishmania and bugs, he holds that the non-success of the former in transmission was due to the fact that he did not inoculate the dejecta of the infected bugs. He believes that Mediterranean kala azar is probably transmitted by the dejecta of fleas either by the alimentary canal (? sucking of the bitten skin) or by skin contamination.

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* *Ceratophyllus fasciatus, C. hirundinis, Ctenophthalmus agyrtes, C. canis, Ctenopsylla musculi, Pulex irritans,* and *Pulex* sp. ? *brasiliensis.*

Trypanosoma rabinowitschi of the hamster develops, according to Nöller, in the rectum of the hamster flea, as well as in *Ceratophyllus fasciatus* and in *Ctenocephalus canis*. The small metacyclical trypanosomes are found in the rectal pouch.

Trypanosoma nabiasi (syn. *T. cuniculi*) develops exclusively, according to Brumpt's experiments [details not given] in the rabbit flea; its cycle is identical with that of *T. lewisi* and metacyclical rectal forms are found. There is no development in the bug.

Trypanosoma blanchardi of the dormouse develops in the dormouse flea; the development, according to the author's observations, is identical with that of *T. lewisi* and *T. nabiasi*; it takes place in the large intestine. Metacyclical trypanosomes live in the rectal pouch and are found in the dejecta. This trypanosome does not develop in the swallow flea nor in the bug.

T. duttoni of the mouse develops in the swallow flea in the same way as the preceding; also apparently in the bed-bug. Eleven mice, three or four days old, were the subjects of experiment. Seven received in the mouth the rectal contents of seven fleas and all became infected. One mouse received in the rectum dejecta containing metacyclical *T. duttoni*; the result was negative. Another mouse inoculated under the skin did not become infected.

The author sums up these observations—

(1) All the trypanosomes of small rodents seem to develop in the same way in fleas, some in one species, others in many.

(2) Metacyclical trypanosomes no longer multiply; they are in a waiting stage (*phase d'attente*) comparable with encysted forms of *C. melophagia*[*] or herpetomonas.

(3) The trypanosomes of small rodents develop in the posterior intestine and are evacuated with the dejecta, with which alone vertebrates become infected.

(4) The trypanosomes which develop in the fleas are clearly primitive parasites of fleas. They differ from the crithidia and herpetomonas found in a number of fleas only by the formation of metacyclical trypanosomes instead of the cysts formed by the said crithidia and herpetomonas.[†]

(5) The trypanosomes of *lewisi* type, although morphologically identical as regards blood and metacyclical forms, are 'natural' species and consequently good species, since in nature they are transmitted only to the host which harbours them.

A. G. B.

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[*] The author calls this parasite *Trypanosoma melophagi* Flu, but reference to Flu's original paper shows that the name given was *Crithidia melophagia*. (*Archiv. f. Protistenkunde*. 1908. Vol. 12. p. 147.)

[†] In a foot note Brumpt says that he has named the parasite discovered by Nöller in *Ctenocephalus canis Herpetomonas pseudoleishmania*. Dr. Fantham points out that in July 1912 (see *Brit. Med. Jl.* Nov. 2 1912) he named this parasite *H. ctenocephali*. Brumpt's name therefore cannot stand.

Brumpt (E.). **Immunité Partielle dans les Infections à *Trypanosoma cruzi*, Transmission de ce Trypanosome par *Cimex rotundatus*. Rôle Régulateur des Hotes Intermédiaires. Passage à travers la Peau.**—*Bull. Soc. Path. Exot.* 1913. Mar. Vol. 6. No. 3. pp. 172-176.

The author made experiments to ascertain if the virus of *T. cruzi* from Bahia was identical with that isolated by Chagas. Nineteen mice which had been severely infected in May 1912 with the virus of Bahia were inoculated in December with considerable doses of the Chagas virus, at the same time as thirty controls of the same age. The results showed that a previous attack with the Bahia virus confers a fairly good resistance to large doses of the Chagas virus.

The author made several experiments with bugs, *C. lectularius* and *C. rotundatus*, to see how the exalted virus of Chagas behaved after it had been through intermediate hosts. These two species of bugs became infected in a proportion of 80 per cent., their dejecta containing 'metacyclical' trypanosomes. These were injected into young mice. The result was that the mice contracted very light infections and recovered in a few days. The exalted virulence had fallen to the natural and resembled that of the virus of Bahia. The author suggests that *C. rotundatus*, which is the bed-bug of Brazil and other tropical regions, may play as important a part in nature in the transmission of *T. cruzi* as *Conorhinus megistus*. Experiments tended to show that in the former species this trypanosome would die out in France during the winter.

The author found that the metacyclical trypanosomes of this species have considerable power of penetration; when they were placed in the mouth or rectum of young mice these were surely infected. There was one instance of infection through the skin. He suggests that man becomes infected through the mucosa of the mouth. The Conorrhinus as a rule bite the face or the lips of sleeping persons; after or during their feed they often drop abundant dejecta which may come in contact with the mucous membrane.

The author refers to Gonder's experiment showing that a strain of *T. lewisi* resistant to arsenophenylglycin loses its resistance after passage through the rat louse. The fact that in the passage through the invertebrate host all the physiological characters acquired in the laboratory are lost makes many laboratory experiments lose their value. Parasites inoculated by intermediate hosts differ both morphologically and physiologically from those which are inoculated from vertebrate to vertebrate. For example, the small metacyclical *T. lewisi* pass easily through the mucous membrane of young rats, whilst the blood forms only exceptionally do so. The fact that various animals are artificially susceptible to a virus does not prove that they can be infected in nature by means of an intermediate host. Secondly, it has been demonstrated that in the laboratory one can infect mice with *T.*

lewisi; in nature it is not so. The author has looked in vain for trypanosomes in wild mice living in the same locality with infected rats. Probably the metacyclical trypanosomes of invertebrates have not the same infective properties as the blood trypanosomes.

A. G. B.

TRYPANOSOME INFECTIONS OF WILD ANIMALS AND OF STOCK.

BRUCE (David), HARVEY (David), HAMERTON (A. E.), DAVEY (J. B.), & Lady BRUCE. **The Trypanosomes found in the Blood of Wild Animals Living in the Sleeping-Sickness Area, Nyasaland.**—*Proc. Roy. Soc.* 1913. Apr. 7. Series B. Vol. 86. No. B 587. pp. 269-277.

The camp of the Royal Society's Commission is situated on one of the hills that rise near the western edge of the flat country adjoining Lake Nyasa. This flat country extends some 20 miles inland and the camp is about ten miles from its edge. The plain is covered with thorn scrub, which is the home of the tsetse fly and also of numerous wild animals. When an animal was shot on this plain by a member of the Commission, thick and thin films of blood were made and a specimen in a bottle with citrate of soda was sent speedily to the camp where it was injected into a goat, a monkey, and a dog. A table shows the result of the examination of 180 specimens of wild game or other animals shot in this area, chiefly from June to September; it is about 50 miles by 25 and is in the heart of the sleeping sickness area in Nyasaland. 57 animals were found to harbour pathogenic trypanosomes, that is 31·7 per cent. Another table gives the species of trypanosomes found in the 180 animals. The authors note that the human trypanosome of Nyasaland agrees in all respects with *Trypanosoma brucei* except as regards the presence of posterior nuclear forms. They write:—

> "In order to compare the two species of trypanosomes more closely, the Commission procured, by the kindness of Dr. A. Theiler, C.M.G., Pretoria, a strain of Nagana from the same spot in Zululand where it was first discovered in 1894. Much to the surprise of the Commission it was found that *T. brucei* has quite as large a proportion of posterior-nuclear forms as *T. rhodesiense,* and that the blunt-ended character is common to both species. The Commission is therefore driven to the conclusion that *T. rhodesiense* is neither more nor less than *T. brucei,* and that the human trypanosome disease of Nyasaland is Nagana.
>
> "To this it may be objected that Nagana has never been known to attack human beings. This has probably been due to faulty diagnosis, cases in man being returned as malaria."

The pathogenic trypanosomes found were *T. brucei* (Plimmer and Bradford) vel *rhodesiense* (Stephens and Fantham) (14 times), *T. pecorum* (26 times), *T. simiae* (3 times), *T. caprae* (Kleine) (20 times), and *T. ingens* (3 times); the last is probably not pathogenic.

Table 5.—The Species of Animals dealt with, the Total Number examined, the Number found Infected, and the Species of Trypanosomes by which they were Infected.

Animal.	Total No. examined.	No. found infected.	*T. brucei* vel *rhodesiense.*	*T. pecorum.*	*T. simiae.*	*T. caprae.*	*T. ingens.*
Eland ...	10	6	—	6	—	1	—
Sable ...	5	0	—	—	—	—	—
Waterbuck...	13	9	3	1	—	8	—
Koodoo ...	3	2	—	2	—	—	—
Bushbuck ...	10	7	—	7	—	1	—
Hartebeeste	35	6	5	1	—	—	—
Reedbuck ...	19	12	3	1	—	9	1
Oribi ...	26	4	1	1	—	1	1
Duiker ...	7	2	1	—	—	—	1
Buffalo ...	9	2	—	2	—	—	—
Lion ...	1	0	—	—	—	—	—
Hyaena ...	3	2	—	2	—	—	—
Elephant ...	2	0	—	—	—	—	—
Warthog ...	33	7	1	3	3	—	—
Wild Cat ...	3	0	—	—	—	—	—
Porcupine ...	1	0	—	—	—	—	—
Total ...	180	59	14	26	3	20	3

From this and the following table it is inferred that in this fly district the waterbuck, hartebeest, reedbuck and duiker are dangerous enemies to man; the eland, kudu, bushbuck and buffalo to cattle, goats and sheep; and that the warthog is the only animal which harbours *T. simiae*, the "lightning destroyer" of the domestic pig.

The conclusions are as follows:—

"1. 31·7 per cent. of the wild game in the fly-country below Kasu Hill harbour pathogenic trypanosomes.

"2. The species of trypanosomes found are *T. brucei* vel *rhodesiense* 7·8 per cent., *T. pecorum* 14·4, *T. simiae* 1·7, *T. caprae* 11·1, and *T. ingens* 1·7.

"3. It is self-evident that these wild animals should not be allowed to live in "fly-country," where they constitute a standing danger to the native inhabitants and the domestic animals. It would be as reasonable to allow mad dogs to live and be protected by law in our English towns and villages. Not only should all game laws restricting their destruction in "fly-country" be removed, but active measures should be taken for their early and complete blotting out.

"4. It must be strictly borne in mind that this only refers to wild animals living in fly-areas. No pathogenic trypanosomes have, up to the present, been found by the Commission in the blood of animals living in fly-free areas."

[These results confirm and extend those obtained by KINGHORN and YORKE in the adjoining country of Northern Rhodesia. (*Annals of Tropical Medicine*, 1912, Vol. 6, pp. 483-493, and this *Bulletin*, No. 9, p. 516.)]

A. G. B.

BALFOUR (Andrew). **Animal Trypanosomiasis in the Lado (Western Mongalla) and Notes on Tsetse Fly Traps and on an Alleged Immune Breed of Cattle in Southern Kordofan.**—*Ann. Trop. Med. & Parasit.* 1913. Mar. 31. Vol. 7. No. 1. pp. 113-120. With 2 plates.

In May 1912 the author visited the sleeping sickness camp at Yei, in what is now known at Western Mongalla, the name Lado having disappeared. He had a few opportunities of examining the blood of transport and other domestic animals. From the blood, sent to him, of three transport bulls a trypanosome was obtained of *pecorum-nanum-congolense* type. 140 parasites were drawn and measured and the results plotted on a chart. The curve is found to answer very closely to that for the Sudan *T. nanum*. The trypanosome is short and has no free flagellum. Its average length is 12·6 microns, minimum 9·8, maximum 17. Its appearance is shown in microphotographs. A dog inoculated with the strain showed trypanosomes for a time. It is uncertain whether the infection was contracted in Western Mongalla. Trypanosomes obtained from infected mules were measured and plotted in the same way. The average length was 17·6 microns, minimum 10·5, maximum 28. These also are figured. The trypanosome is of *brucei* or *gambiense* type and is dimorphic. A marked feature is the frequent occurrence of an unstained area, usually of spherical shape, in the neighbourhood of the blepharoplast. A curve is given showing two apices, but only a hundred trypanosomes could be drawn.

2. The author has previously drawn attention to the subject of tsetse fly traps (see *Sleeping Sickness Bulletin*, Vol. 4, p. 309). He has had large traps constructed by the Andres Maire Company. One is shown in a figure. RANKEN is to take two of these traps with him to Yei and carry out experiments. The following measures will be tried:—

1. Soaking the central bands or wicks in a mixture of water and either human or animal sweat.
2. Placing a live animal in the trap.
3. Soaking the central bands in citrated blood and at the same time hanging in the trap a piece of fresh meat with the skin still adhering.
4. Soaking the bands as above and having in addition a tube of citrated blood arranged according to the ingenious device of RODHAIN and his colleagues (see this *Bulletin*, No. 3, p. 124).

3. A photograph is given of a bull of the small black breed found in Southern Kordofan. This breed is said to be immune to trypanosomiasis and is the only breed which can live in the infected Koalib area where *G. morsitans* abounds and conveys an infection due, Balfour believes, to *T. brucei*. He notes that an apparently similar breed exists in Northern Nigeria [figured opposite p. 26 of the same *Annals*]. The effect of the blood serum of this bull is to be tested on various trypanosome strains.

A. G. B.

Macfie (J. W. Scott). **Trypanosomiasis of Domestic Animals in Northern Nigeria.**—*Ann. Trop. Med. & Parasit.* 1913. Mar. 31. Vol. 7. No. 1. pp. 1-20. With 3 plates.

The author gives instances of the grave nature of the losses occasioned by trypanosomiasis of domestic animals in the south-west portion of Northern Nigeria, in the province of Ilorin. Cattle, sheep and goats are usually slaughtered when they become sick. The table shows the infecting agent in 86 cases of naturally acquired trypanosomiasis. Reference is made to that published in the *Sleeping Sickness Bulletin* (Vol. 3, p. 422) when the identifications were made by Sir David Bruce.

Table II.—Showing the infecting agent in eighty-six cases of naturally acquired trypanosomiasis in domestic animals in Northern Nigeria.

Host.	*T. brucei.*	*T. vivax*	*T. nanum* or *T. pecorum.*	*T. theileri.*	Double infections.
Horse	14	18	8	—	3
Donkey	2	2	—	—	—
Cattle—					
Fulani breed ...	1	18	1	—	1
Dwarf breed ...	—	2	—	1	—
Sheep and ram ...	1	8	1	—	—
Goat	—	4	—	—	—
Dog	—	1	—	—	—
Totals ...	18	53	10	1	4

The morphological characters of the trypanosomes found in blood films had to be relied upon for identification.

T. brucei.—A trypanosome which closely corresponded with the type described and figured by Bruce and others as *T. brucei* was found in twenty cases of natural infection. It is suggested in a foot-note that this trypanosome is probably that for which Stephens and Blacklock have recently proposed the name *T. ugandae.* In three horses and one donkey posterior nuclear forms were detected, and in guinea-pigs and rats inoculated from them appeared at certain stages of the disease in relatively large numbers. Of eleven horses and two donkeys suffering from this form of trypanosomiasis none recovered. All the cases in which posterior nuclear forms were observed were of acute type.

T. vivax.—This parasite occurred in 56 of the 86 cases. From the fact that it was found in the dog, the author writes, it is probable that this parasite is that to which Ziemann gave the name *T. vivax* and not the allied *T. cazalboui* described by Pécaud as occurring in Dahomey in horses. It is difficult to say what would be the fate of cattle, sheep, and goats because they are slaughtered to anticipate death.

The author notes that *G. palpalis* and *G. tachinoides* are distributed throughout the province, and *G. submorsitans* and *G. longipalpis* are restricted to one division of it; 24 of the animals, infected with one or other of the three types, had never been in this division.

A chart is given of the rainfall and the number of admissions of horses to the isolation camp at Zungeru for 1911; it tends to show that trypanosomiasis increases with the rains. The author states that no immunity follows an attack of trypanosomiasis, reinfections with the same or different species of trypanosome being met with. The dwarf cattle mentioned by Foy and by Pollard were found by Macfie to be tolerant of *T. vivax*, but one succumbed to a large injection of *T. brucei*. A tabular synopsis is given of the cases observed, and photographs of infected animals and of the dwarf cattle.

In the summary it is stated:—

> " *T. vivax* is the most common form [of trypanosome] at any rate in the south-western portions of the Protectorate, being present in fifty-five out of eighty-four cases collected in Ilorin province, the Niger province, and at Lokoja.
>
> " Of twenty Fulani cattle treking down towards the coast from the provinces of the north, and found to be suffering from trypanosomiasis, eighteen harboured *T. vivax*.
>
> " In horses *T. vivax* produces a much less serious disease than *T. brucei*. Of fifteen cases infected with *T. vivax*, of which the records are complete, fourteen recovered. Of eleven cases infected with *T. brucei* none recovered."

A. G. B.

Bruce (David), Harvey (David), Hamerton (A. E.), Davey (J. B.), & Lady Bruce. **Trypanosome Diseases of Domestic Animals in Nyasaland. II.** *Trypanosoma caprae* **(Kleine).**—*Proc. Roy. Soc.* 1913. Apr. 7. Series B. Vol. 86. No. B 587. pp. 278-284. With 1 plate.

Trypanosoma caprae belongs to the vivax group which consists of three species (*T. uniforme*, *T. vivax* and *T. caprae*). They are harmless to the smaller laboratory animals, monkeys and dogs. They develop in the proboscis of tsetse flies. *T. caprae* is transmitted by *Glossina morsitans*.

The morphology of *T. caprae* is described in detail, as seen in living and stained preparations. The average length of 500 specimens of the parasite was 25·5μ, the trypanosomes being measured from waterbuck (20), ox (40), goat (260) and sheep (180). The maximum length was 32μ, the minimum 18μ. The breadth averaged 3μ. A chart shews the distribution in respect to length of 500 individuals of *T. caprae*, Nyasaland. The curve is that of a monomorphic trypanosome with a peak at 25μ.

" *T. caprae* differs from *T. vivax* in that it is heavier built and altogether has a larger and clumsier appearance" . . . . " There is a well marked free flagellum which averages 6·5μ in length.'

" In goats and sheep . . . *T. caprae* runs a fairly fatal course." It is " not of much pathological importance as far as oxen are concerned."

The host or reservoir of *T. caprae* is the "wild game" (reedbuck, waterbuck, eland and bushbuck). 10·5 per cent. of the wild game examined contained the trypanosome.

Tables give the dimensions of the trypanosomes measured and various details as to the animals inoculated. The paper is illustrated by a coloured plate.

H. B. F.

UNCLASSED.

PONSELLE (A.). **Recherches sur la Culture in Vitro du Trypanosome de l'Anguille (*Trypanosoma granulosum* Laveran et Mesnil, 1902). Une Nouvelle Modification au Milieu de Novy et MacNeal.**—*Compt. Rend. Soc. Biol.* 1913. Feb. 21. Vol. 74. No. 7. pp. 339-341; & Mar. 14. No. 10. pp. 522-524.

The author has succeeded in maintaining *Trypanosoma granulosum* of the eel for some time on the Nicolle and Mathis modifications of the Novy-MacNeal medium, but the parasites only resemble those in the blood of the eel, and no developmental cycle was obtained. Recently on a modification of the N.N. medium he has obtained a development of *T. granulosum* similar to the stages found in the alimentary canal of the leech, *Hemiclepsis marginata*. The formula of the medium is:

Unwashed gelatine	20 grammes.
Ordinary water	1,000 cc.

The gelatine, melted and filtered, is placed in tubes, 2 to 3 cc. per tube, and then sterilized. After cooling to about 50°, it is mixed with its own volume of defibrinated rabbit's blood and allowed to solidify in sloped tubes. Inoculation is made, with the uncitrated blood of the eel, into the liquid of condensation. The special characteristic of the medium consists in the complete suppression of sodium chloride, which makes the solution very hypotonic to the blood of vertebrates.

In the later paper the author reports that *Trypanosoma granulosum* has now succeeded in a series of four passages, the fourth successive series of test tubes having been inoculated and yielding cultures of crithidial forms that multiplied actively. There are 17 text figures of these various cultural forms.

One eel, considered to be uninfected, was inoculated subcutaneously with two drops of a primary culture nine days old. Seven days later a few trypanosomes were present in the blood; on the 13th day they were still more rare. A second inoculation experiment on another eel, however, failed. The author states that one cannot be certain that the first eel did not harbour trypanosomes that were extremely rare at the time of incubation. Further experiments with elvers, which are usually without trypanosomes, are to be undertaken in May.

T. phoxini, *T. tincae* and *T. lewisi* also have been cultivated on Ponselle's modification of the Novy MacNeal medium, but a successful culture of *T. brucei* has not been obtained.

H. B. F.

UHLENHUTH (Paul) & EMMERICH (Emil). **Ueber das Verhalten des Kaninchenhodens bei experimenteller Trypanosomen- und Spirochäteninfektion.** [The Behaviour of the Testes of the Rabbit in Experimental Infections with Trypanosomes and Spirochaetes.]—*Deut. Med. Wochenschr.* 1913. Apr. 3. Vol. 39. No. 14. pp. 642-644.

Experiments by UHLENHUTH and MULZER have shown that one can produce in the testis the first visible signs of infection with syphilis, not only by direct inoculation into that organ, but sometimes also by the injection of infected material into the blood. The testis of the rabbit in fact forms for *Spirochaeta pallida* a culture apparatus in vivo, as Uhlenhuth has expressed it. The testis plays a similar part in certain other infections, as in experimental glanders in the guinea-pig, trichophyton disease in the rat, as well as mumps and smallpox in man. The authors determined to make similar experiments with trypanosomes.

Dourine.—In the full-grown guinea-pig this disease takes a slow course as a chronic tissue infection, trypanosomes being found sparingly in the blood. A rabbit received in both testicles an injection of blood from an infected mouse. After some days both the organs were enlarged and a testis puncture a week later showed numerous trypanosomes, whereas none were present in the blood. From the same mouse a second rabbit was injected intravenously; this also a week later showed a swelling of the testes and numerous trypanosomes in the puncture fluid, while the blood was negative. In a third case in which the rabbit received the injection in the peritoneum trypanosomes appeared first in the blood, but later they were found in the testes when they had disappeared from the blood. In another experiment in which trypanosomes were introduced into one testis they were found a week later in the other. They are demonstrable in this organ in large numbers at every puncture. Experiments are detailed in which they appeared three days after the injection had been made. The authors suggest that the natural disease in the horse might be diagnosed in this manner.

Experiments were next made with *Trypanosoma brucei*. Trypanosomes were to be found only for a short time in the testes, even when introduced by that channel, and only once did they appear, temporarily, in that organ when they had been introduced into the blood.

Experiments with *Trypanosoma lewisi* were negative.

Trypanosoma gambiense.—The strain used was from a guinea-pig. The experiments are detailed. The results were similar to those of the dourine experiments. The trypanosomes in a short time undergo enrichment in the testes and occur there at an earlier period than in the blood of control mice. The authors suggest that it would be of value to ascertain if such an enrichment is observed when the blood of sleeping sickness patients is injected into rabbit's testes.

A. G. B.

LAVERAN (A.) & ROUDSKY (D.). **Essais d'Immunisation contre les Trypanosomes pathogènes.—Trypanotoxines.**—*Bull. Soc. Path. Exot.* 1913. Mar. Vol. 6. No. 3. pp. 176-181.

BRAUN and TEICHMANN succeeded in immunising mice, rats, guinea-pigs, and rabbits against several pathogenic trypanosomes, especially *T. brucei*, by one of the following procedures—(1) By injecting into the peritoneal cavity of the animals to be immunised dried and powdered trypanosomes suspended in salt solution; (2) By immunising rabbits with the dried trypanosomes and introducing their serum into the peritoneal cavity of mice. The vaccinated animals are tested with a strain of low virulence.

The authors have followed almost exactly the technique employed by BRAUN and TEICHMANN, but ceased to use toluene because they found it very poisonous; they obtained good results with the powder prepared aseptically. The trypanosome used for the experiments was the *T. brucei* of nagana (Ferox of EHRLICH). The powder was first used on eight mice with the same number of controls, then on two rabbits with one control, and lastly the serum of rabbits treated with dried trypanosomes was injected into three mice with the same number of controls. All these experiments were entirely negative. The rabbits and mice treated with the powder were not immunised against nagana; the development of the infection was not even delayed in them. The serum of the treated rabbits was quite inactive. They remark too that the process is hardly practicable. For these few experiments they were obliged to kill 100 large rats.

According to BRAUN and TEICHMANN, *Trypanosoma brucei* contains no toxin. The authors do not agree. They refer to experiments recorded in a previous paper (see *Sleeping Sickness Bulletin*, Vol. 3, p. 132) and give the details of two fresh ones. In the first a white mouse which received 6 cgm. of *T. brucei* powder became very ill, but eventually recovered. In the second instance after the same dose a white mouse died with subnormal temperature. They say that these results were always obtained, and show that a trypanotoxin exists.

A. G. B.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES
BULLETIN.

Vol. I.] 1913. [No. 12.

PELLAGRA.

Wood (Edward Jenner). **A Treatise on Pellagra for the General Practitioner.** 1912. New York & London: D. Appleton & Co. xiv. + 377 pp. With 38 illustrations in text. [16*s*. net.]

This book is from the pen of the chairman of the North Carolina Pellagra Commission, who, in 1907, before G. H. Searcy had discovered the existence of pellagra in Alabama, had reported the case of a lunatic suffering from what was erroneously called symmetrical gangrene of the skin. The author now states that this was a case of true pellagra, in whose blood both tertian and quartan malarial parasites were also found.

He has verified the greater portion of Tizzoni's claims in his own laboratory in North Carolina, but "after a careful study the only conclusion that seems justifiable is that the disease produced by the strepto-bacillus of pellagra (Tizzoni) was not pellagra."

The writer tells us that he is not a believer in the maize theory, and he speaks with profound respect of Sambon's views, though he cannot accept his statement that pellagra is limited to certain rural districts only, avoiding towns and villages. The youngest patient seen by the author was 22 months old, but he has only seen one fatal case in childhood—a negress aged eleven years. One is surprised to learn that in some general hospitals in the Southern States there are restrictions forbidding the admission of pellagrous cases to the wards; the author mildly agrees with the many writers who have shown that the disease is not communicable from man to man.

In the excellent chapter on skin manifestations there are some good photographs and there is a diagram of a young woman whose "skin lesion covered the whole of her back from the lower border of the scapula up to the very hair border of the neck and anteriorly from the upper portion of the breast to the chin. The remarkable feature of this case is that where the chemise-shoulder straps crossed the shoulders there was no skin involvement at all." The author rightly observes that he knows no way of differentiating a recent sunburn from a recent initial attack of pellagrous

(29765—2.) Wt. P 321—84. 1800. 5/13. D & S.

erythema. He is of opinion that "the symptoms of sprue are almost identically those of pellagra without skin manifestations."

[From this we must assume that he has never seen a case of typical sprue, for, though he quotes Sir P. MANSON'S writings, he has not mentioned the vesicles and ulcers of the mouth in sprue, nor the absence of nervous and mental sequelae in so many cases of that disease.]

Many cases of pellagra in the past have been diagnosed in the United States as chronic eczema. It is rather surprising to learn that it is a daily problem with the author and his colleagues to differentiate between syphilitic myelitis and similar pathological conditions produced by pellagra, pending a Wassermann or Noguchi test. Four excellent micro-photographs of the dorsal region of the spinal cord, prepared by H. A. COTTON from a negress, aged 17, confirm the pathological findings originally made by TUCZEK in 1893. The author points out that the chief interest of this case lies in the fact that the girl only began to be ill early in May 1909, and died towards the end of the following August, yet at the autopsy, which could only be partially performed, owing to threatening negroes, the organic changes were present which are not usually found until the third year of the disease. It was a very severe case from the beginning, for on June 11th, after severe pain in the lumbar region, she had lost the use of the lower limbs; the paraplegia was quickly followed by extreme emaciation, bed sores, retention of urine, vomiting, oedema of the feet, stupor and slight fever. He further tells us that in one house he saw three deaths after only six weeks' illness. This very acute or fulminating type of pellagra is as incurable as is acute miliary tuberculosis. He compares these acute cases in epidemic form in the United States with the outbreak of measles in Fiji in 1875, when 40,000 out of the 150,000 inhabitants died within four months. He now believes, however, that pellagra in America has settled down into a chronic endemic form, because for more than two years he has not seen a fulminating case. The large majority of fatal results was in patients whose skin lesions were of the moist variety, and he has noticed that coarse clonic contraction of the muscles of the forearms is a symptom always followed by death. He agrees with other observers that the co-existence of hookworm disease or alcoholism affects badly the prognosis. It is pointed out that treatment need not await the solution of the question of etiology, for both malaria and syphilis were provided with specific drugs years before their etiology was determined. He praises atoxyl and other forms of arsenic, disbelieves in quinine, except for pellagra complicated by malaria, and has great faith in change of climate. This useful book, which contains pages of quotations from other writers, closes as follows:—

> "Pellagra can no longer be counted among the incurable maladies. There is as much hope of success in its treatment as in many other diseases which are counted far less malignant. It is not a self-limited disease and, unless vigorously treated from the beginning, the same result must be expected as in improperly treated syphilis. The therapeutic nihilist has no more right to treat pellagra than to treat syphilis. Finally the fact must be emphasized that the most successful treatment of pellagra consists in the early diagnosis."

F. M. Sandwith.

ETIOLOGY.

JENNINGS (Allan H.) & KING (W. V.). **One of the Possible Factors in the Causation of Pellagra.**—*Jl. Amer. Med. Assoc.* 1913. Jan. 25. Vol. 60. No. 4. pp. 271-274.

The authors premise that the essential factors in the cause and spread of pellagra must be uniformly active wherever the disease is endemic. They then assume that pellagra is an insect-borne disease, and quote KNAB's finding that for an insect to be a potential transmitter of human disease, the following four factors are essential: the habit of biting man regularly, more or less close association with man, a certain degree of longevity and, finally, abundance. These are among their conclusions:—

"Under conditions existing in the region of pellagrous endemicity in South Carolina, the lice, fleas, mosquitoes and bedbugs show characteristics of habit, distribution and abundance which appear to exclude them from serious consideration in this connection.

"The biting habits and, to a certain extent, the distribution of the flies of the genus *Simulium*, together with their lack of habits which bring them into close association with man, seem to present weighty arguments against the incrimination of these gnats as the active agent in the transmission of pellagra.

"The cosmopolitan biting stable-fly, *Stomoxys calcitrans*, from its distributional and biting habits, its close association with man, its conformation to the obvious requirements of the disease-transmitting insect and the agreement of its special characteristics with the phenomena incident to the occurrence of pellagra, offers strong reasons for its consideration under the premises.

"It is hoped that attention may be directed to this fly and observations bearing on its possible relation to the disease be generally made."

F. M. S.

TIZZONI (G.) & DE ANGELIS (G.). **Studi Intorno alla Biologia e alla Morfologia dello Streptobacillo Pleomorfo della Pellagra. Nota Preventiva.** [Preliminary Note on the Biology and Morphology of the Streptobacillus of Pellagra.] — *Pathologica.* 1913. Mar. 15. Vol. 5. No. 105. pp. 173-174.

The second author, while studying in Bologna the movements and the velocity of the streptobacillus, gradually discovered the existence of two types. Type A, which is Gram-negative and does not liquefy gelatine, can, under certain circumstances, pass into Type B, which is Gram-positive and liquefies gelatine. The authors cannot account for some of the phenomena which they think they ought to report. They now consider, from further study of its morphological characters, that the streptobacillus should be classed in the group of the Actinomyces.

F. M. S.

MILLS (H. P.). **Pellagra with Special Reference to Pathology of Gastro-Intestinal Tract.** —*Jl. Amer. Med. Assoc.* 1913. Mar. 22. Vol. 60. No. 12. pp. 889-892. With 3 figs.

Notes are given of four autopsies upon five cases which died in a hospital at St. Joseph, Missouri. The patients were all

women, aged 40 to 64, and three of them had lived in the asylum for periods varying from three and a half to thirteen years. The changes found were those of a chronic catarrhal inflammation, in one case extending from the oesophagus to the transverse colon, and in some areas there was haemorrhagic inflammation of the mucous membranes.

> **"Microscopic examination of sections of the stomach wall (in one case where the skin lesions had only been noticed for four weeks) showed superficial necrosis with extensive destruction and exfoliation of glandular epithelium, infiltration between the gland tubules, frequently haemorrhagic, with cystic dilatation of the gland tubules. The vessels in the submucosa were greatly dilated and atrophy of the muscular layers was noted . . . In the lower portions of the ileum there was almost entire destruction of the mucosa; only in areas were epithelial remnants seen, a narrow line of partially necrotic tissue being left to mark its location. The muscular layers were atrophied so that in this region the intestinal wall was extremely thin. Sections taken from the caecum and ascending colon showed a destructive process similar to that in the ileum."**

The general findings "would seem to coincide with the theory that toxic products cause pellagra, whether taken with food products or of endogenous origin. In the cases observed no probable causative factor in the food could be found."

The figures represent the skin lesions in the patient, aged 64, from whose autopsy the quotation has been taken.

[No information about the diet is given.]

F. M. S.

SYMPTOMATOLOGY AND PATHOLOGY.

COHOON (E. H.) & FARNELL (F. J.). **Pellagra with a Report of 17 Cases.**—*Boston Med. & Surg. Jl.* 1913. Jan. 9. Vol. 168. No. 2. pp. 50-56.

Writing as Rhode Island neurologists, the authors tell us that pellagra was first discovered in that state in the summer of 1910. The cases now reported were patients in the lunatic asylum at Howard, and fifteen of them were adult females. It is considered that the complex reaction of pellagra is due to a toxine or an infection which produces changes in the blood and spinal fluid, and a non-systemic degeneration of the cerebro-spinal axis. The blood count showed a variation of haemoglobin from 60 to 100 per cent., a distinct increase in mononuclears and a decrease in polymorphonuclear leucocytes. Nine of the seventeen cases were submitted to lumbar puncture and the spinal fluid was examined cytologically, chemically and for the complement deviation. The reaction was alkaline in five and neutral in four. In only one were there no "pleocytes," the remaining eight showed a count of from two to nine small lymphocytes per cmm. The quantity of globulin content showed no increase and each case evinced the presence of a reducing body. The complement deviation in all was negative in the spinal fluid and in two of the blood sera.

Four autopsies were made; two of them showed tubercle of lungs and intestines, so the central nervous system was not examined; the microscopical results of one case are not yet ready, but those of the fourth case are recorded. An American woman, aged 63, was admitted to the asylum in 1887 for dementia precox.

In August 1909 she suffered from persistent diarrhoea, which improved during the winter months. In August 1910 diarrhoea returned with erythema on the hands; improvement again in the winter. In July and August 1911, diarrhoea, "skin lesions, and knee jerks diminished with no sensory disturbances." Sections from the brain showed: "regressive changes in the pia which was free from any infiltration; in the cortex the nerve cells stained diffusely and the largest pyramids showed incipient and well advanced axonal alterations, *viz.*, glassy swelling of the centres of the cells, destruction of the central stainable substance with preservation of the stainable bodies in the periphery of the cells and displacement of the nucleus toward one side. The neuroglia showed moderate progressive change with a definite increase in the satellite cells, which occurred about the nerve cells or as independent clusters, as well as along many of the blood vessels. There was also considerable pigment in the ground substance, largely within the neuroglia cell bodies. The section from the cerebellum showed, perhaps, the Purkinge cells staining more diffusely and some of them showed a fairly typical axonal alteration. The lumbar cord section evinced the pia essentially normal, but many of the ventral horn cells indicated a well marked axonal alteration and others showed only incipient axonal changes."

In more than half the cases the knee jerks were absent and others had diminished knee jerks, while eight cases "evinced distinct evidence of peripheral polyneuritis, even to the extent of foot drop and muscular atrophy." The authors inquire whether it is not possible or even probable for pellagra to produce neuritic symptoms of central as well as of peripheral origin.

Conclusion:—**"The microscopic findings in the central nervous system are such as are comparable essentially to that rare disease known as 'Central Neuritis,' the nerve cells showing an infectious or febrile condition of essentially a parenchymatous reaction."**

F. M. S.

Robbins (F. C.). **Report of a Case of Pellagra.**—*Med. Record.* 1913. Jan. 11. Vol. 83. No. 2. pp. 55-56.

A woman, aged 42, who had never been out of the State of New York and who barely supported herself and two children by charing, had some premonitory symptoms of diarrhoea and exhaustion, but did not apply for treatment for a recent pellagrous rash on the back of one hand until June 4, 1912. She died on July 28, of dysenteric diarrhoea, stomatitis, mental depression and the partial dumbness which so often accompanies the nervous symptoms of pellagra. Her early death may have been influenced by exophthalmic goitre, which can be recognised in the illustration in the paper.

The brain was examined at the New York Psychiatric Institute, and reported on as follows: "The largest nerve cells (Betz cells) of the motor area and some of the pyramids next in size showed extensive axonal alteration of the type seen in 'central neuritis,' as described by A. Meyer. These cells also contained a good deal of pigment, and fat stains showed considerable lipoid substance in most of the larger nerve cells and about the neuroglia nuclei."

Maize meal was apparently not an important part of the woman's diet.

[The spinal cord does not seem to have been examined after death.]

F. M. S.

SHERMAN (W. H.). **A Case of Pellagra.**—*Boston Med. & Surg. Jl.* 1913. Jan. 9. Vol. 168. No. 2. p. 50.

The patient described was a labourer in a woollen mill, aged 68, English by birth, but had lived in Massachusetts for the last nine years. A previous history of indigestion, bodily fatigue and mental irritability was followed, in August 1912, by an erythema which began on the backs of the hands and was seen later on the face and back of the neck. "Bullae and vesicles appeared on the hands but not on the face." Severe stomatitis, epigastric discomfort, emaciation, loss of memory and mental depression occurred. "He denied having eaten maize or any corn products."

[Bullae, though rare in most pellagra countries, seem often to be met with in the United States.]

F. M. S.

GREEN (B. E. M.). **A Review of 131 Cases of Pellagra.**—*Southern Med. Jl.* 1913. Mar. Vol. 6. No. 3. pp. 171-174.

The Director of the Georgia State Sanitarium submits some statistics on lunatics admitted during the past twenty months. The greater number were suffering on admission from a first attack of pellagra, though one was said to have had an attack annually for the last ten years. The patients were coloured and white, of both sexes, mostly born in Georgia, married and engaged in agricultural pursuits. As regards social circumstances more than half of them belonged to the class of wage-earners who have sufficient for the day, but who put by nothing, while a quarter of them lacked sufficient food and clothing.

The chief complications mentioned were pulmonary tuberculosis, cardiac valvular disease, arterio-sclerosis and syphilis. [Alcoholism and hookworm disease do not appear on the list.] Death accounted for 61 per cent., but most of the others recovered from the pellagra, though not always from the insanity. The chief subjective complaints were headache and giddiness, mental condition usually depressed, with confusion of thought, restlessness and loss of memory for recent and remote events. The deep reflexes were increased in 91 cases, diminished in ten, and absent in three patients. 24 had suicidal tendencies and 53 had persecutory delusions.

F. M. S.

ROSSI (Ottorino). **Klinischer und anatomo-pathologischer Beitrag zur Kenntnis des sogen. Pellagratyphus.** [Clinical and Pathological Contribution to Knowledge of so-called Pellagra-Typhoid.]—*Jl. f. Psychologie u. Neurologie.* 1913. Jan. Vol. 20. No. 1-2. pp. 1-23. With 1 plate.

This contribution is from the temporary Director of the Clinic for nervous and mental diseases in the Royal University of Sassari, Sardinia, and is illustrated by 15 micro-photographs, besides a plate of beautifully coloured cells from the spinal cord, brain, sympathetic ganglia and pancreas. The author reports in detail a case which he studied in Florence in 1911. The patient had been an eater of large quantities of maize, was a peasant 60 years old and already pellagrous for 7 or 8 years before he was admitted to the hospital. He died four days after admission; his temperature varied between 100° and 102°. On first examination it was thought that his mental condition was too confused for him to be able to give an account of himself, but next day, when his mind was clearer and quieter, he was able to answer short questions, though he very easily became fatigued and had loss of memory for recent events. His only skin lesions were on the backs of his hands; the pulse was small and rapid, but not easily compressible; breath fetid, gums inflamed, tongue dry with raised papillae and a thick sooty layer at the back; diarrhoea with yellow motions.

The results of the post mortem examination supported the diagnosis because no other gross lesions were found. The author quotes KOZOWSKY as saying that there is no alteration at necropsy peculiar to pellagra. On microscopical examination degeneration of the cord, as originally described by BELMONDO, was present, besides recent alteration of the anterior horn near the lateral ventricle and the simultaneous occurrence of the phenomena of primary and secondary reaction.

It is obvious that the diagnosis of pellagra-typhoid must be more clearly defined and before coming to the diagnosis certain diseases must be excluded, such as enteric fever occurring in a pellagrous patient, para-typhoid and infection by bacillus coli and other secondary infections by which a pellagrin might be attacked.

It is also necessary to diagnose the condition in lunatics from ordinary amentia, but the author considers that the infrequency of hallucinations, the general friendliness of the patient, the possibility of obtaining correct answers from him and many other signs are sufficient to distinguish pellagra-typhoid from amentia. He maintains that it is wrong to consider that this symptom complex is merely an acute stage of pellagra. He finds himself in agreement with other authors, who have stated that pellagra-typhoid only occurs in patients who have suffered from pellagra for a definite period of time, such as two to eight years. Usually the condition only arises after the patient has been for some months in an institution. The author thinks that this stage would be better understood if the symptom complex were considered a phenomenon of hypersensibility. This might explain why the complication only appears among people already infected with pellagra, and why it may occur among them, even if no chronic degeneration of the parenchymatous organs exists. The experiments of ASCOLI prove that hypersensibility phenomena may occur in pellagra, for he produced a febrile condition in pellagrous patients by injecting a watery solution of diseased maize, though he could not cause a rise of temperature in normal people. Later, VOLPINO found that the injection of one or two cc. of the same solution caused in most pellagrins fever, stupor, coma or mental excitement and tremors, whereas a similar injection into a healthy person or into a patient suffering from other nervous diseases only elicited a very slight rise of temperature.

F. M. S.

MALFILATRE & DEVAUX. **Du Syndrome Pellagroide.**—*Ann. Médico-Psychologiques.* 1913. Jan. 10 ser. Vol. 3. (81st year.) No. 1. pp. 15-22.

During 1911 three chronic lunatics under the care of the authors developed diarrhoea and skin lesions in the St. Lizier Asylum near the Spanish frontier. The patients had been in the asylum for periods of five years, three years, and fourteen months before the erythema was discovered. The authors confess to very little knowledge of pellagra and allow that two of the patients were tubercular, as verified by autopsy, while the third who suffered from epilepsy and rheumatic pains had just undergone boracic acid treatment which had produced "swelling of the legs, erythema and loss of appetite." These three cases were not associated with bad maize, nor with the sun's rays.

The authors ask whether pellagra is a real pathological entity.

F. M. S.

EPIDEMIOLOGY.

GRIMM (R. M.). **Pellagra. A Report on its Epidemiology.**—*U.S. Public Health Rep.* 1913. Mar. 7. Vol. 28. No. 10. pp. 427-450. With 13 charts; and Mar. 14. No. 11. pp. 491-513. With 6 plates and 3 maps.

This is a report upon field work during the summers of 1911 and 1912 by a medical officer of the United States Public Health Service, who visited 25 counties in South Carolina, Georgia and Kentucky. More than 200 medical practitioners were interviewed and information was obtained about 1,426 cases, of which 323 were seen by the author, who also personally visited 296 pellagrous homes. South Carolina supplied more than half the total number, mostly among white women aged between 20 and 40. Among the coloured patients, nearly three-fourths were women, and no explanation can be given of the great preponderance in both races of affected females. The month of onset of the symptoms was determined in 181 cases and it was found that nearly three-fourths of the patients referred the beginning of their troubles to months between April and July. Most of the families affected "seemed to be living a hand-to-mouth existence depending for their support upon what they earned from day to day.

Cases were seen, however, among the well to do, who had developed the disease under conditions and living environment which apparently seemed above criticism."

Most of the houses visited bore signs of negligence, shiftlessness and bad hygiene and even when sufficient wages were being earned, the families did not seem to understand the art of improving their home conditions.

As regards insects the bug and house fly were usually present, and, when looked for, Simulium near the affected houses was discovered by the entomologists, Messrs. JENNINGS and KING. Maize granaries supplying two families in country districts were "found to be heavily infested with weevils and moths."

The districts visited appeared to be well watered and to have numerous streams running through them; in fact it was difficult to find areas far removed from running water. Swamps and ponds were also numerous, mosquitoes and malaria were common. The economic condition of the pellagrous was classified as 258 living in poverty, 59 in comfort and 6 in affluence.

"Not a few of the pellagrins who had been born and reared in the country had apparently not developed pellagra until after they had moved into the environment of a village or town," where they became wholly dependent for their food upon small stores.

Every one of the 323 cases personally seen gave a history of the more or less regular use of maize products as articles of diet and much of the maize had been imported from other states. In several of the districts it was reported "that some of this imported meal had been condemned after a chemical examination of it had been made. In a number of instances the pellagrins described the condition of the meal at the time they had bought it at the stores as being sour, sorry or musty, but many of them considered the meal which they had been using as first class." In making the house-to-house visitation, many early unrecognised cases were discovered, and though the author has not included these doubtful cases amongst his figures, he has heard that some of them "have since developed the disease in pronounced form and succumbed to it."

The author finds in his summary that more pellagrous cases developed in small towns and villages than in rural districts. He declines at present to form any definite conclusions regarding the etiology of the disease.

"The possibility of some insect playing a part in the dissemination of the disease does not seem inconsistent with the facts presented above. From my observations the relationship between food and pellagra seems to be a real one, but whether the character of the food may act only in predisposing to conditions which favor the development of pellagra, or whether certain articles of food act as the real exciting agent, or whether they act only as exaggerators of the symptoms (as the sunlight, for instance), is an open question. It is possible that certain articles of food may act in all three ways. In the present state of this question no investigation of the etiology of pellagra can entirely ignore the character of the food supply used by the people among whom the disease is prevalent. The great prevalence of pellagra in certain districts and the important relation that exists between pellagra and the public health would seem to be ample justification for undertaking on a large scale the

herculean task of unraveling the etiology of this puzzling disease, in order that measures based on fact might be instituted for its prevention."

[A valuable unbiassed contribution. It is to be hoped that the United States Government will not turn a deaf ear to these closing lines of the report.]

F. M. S.

BRAULT (J.). **Note sur la Pellagre en Algérie.**—*Bull. Soc. Path. Exot.* 1913. Mar. Vol. 6. No. 3. pp. 198-201.

The author records 29 cases which have been observed in Algiers between 1898 and 1911. Though in one year there were eight cases admitted, the disease would appear to be present only sporadically. Half the patients were natives, the remainder were mostly Spanish or French, all very poor, and some of them alcoholic. It is stated that the patients had never eaten maize, or if they had eaten it it was at rare intervals and long ago.

[No information is given as to whether or not pellagra is found in the country districts of Algiers.]

F. M. S.

SAMBON (L. W.) & CHALMERS (A. J.). **Pellagra in the British Islands.**—*British Med. Jl.* 1912. Oct. 26. pp. 1093-1096.

The authors state, without hesitation, that pellagra is endemic and has long been endemic in various parts of the United Kingdom. The first notice of it was by Dr. BROWN, Inspector-General of the Scottish Lunatic Asylums, who found in 1860, two idiots of one family in the remote east of Scotland with "an alteration of the skin which he qualifies as a kind of pellagra." In 1866, Dr. J. C. HOWDEN, Medical Superintendent of the Montrose Royal Asylum, published a case of typical pellagra in a female factory spinner from Arbroath, Forfarshire, who had been admitted under his care in August 1863. The next certain case was published in 1909 and occurred in a young woman from Shetland, who was admitted to the Royal Edinburgh Asylum in 1908; Dr. R. D. BROWN and Dr. R. C. LOW described her as suffering from dermatitis of face, backs of hands, wrists and lower parts of fore arms, backache, spastic legs, stomatitis, diarrhoea and delusions. In April 1912 Dr. R. C. Low had the advantage of seeing some pellagrous peasants in Italy and stated to the authors that the Italian symptoms were identical with those of the Shetland case and also resembled an unrecorded case from Fifeshire, which he had seen in Edinburgh in 1911.

The authors, in the autumn of 1912, visited Scotland to try and see how far pellagra is prevalent there, and they now state that it is "certainly endemic in Fifeshire, Forfarshire, Aberdeenshire and the Shetland Islands." Among other suspected areas they visited the village in Fifeshire where the unrecorded case had always lived until her death in 1911. In the fields adjoining a stream near her birthplace they "obtained very clear statements from the field labourers of the attacks of small biting flies coming in clouds in the early morning, and especially in the evening."

In this stream the authors found many larvae and some pupae of Simuliidae. No history of this patient having eaten maize could be obtained, but she had a peculiar habit of eating raw oatmeal. The authors had the opportunity of examining the three children of this patient; they showed no signs of pellagra, but they are inclined to believe that the sister of the patient is also pellagrous. At the Aberdeen Royal Asylum they were told by the Superintendent of a possible case from New Aberdour, which had recently died in the asylum; the medical officers recognised that the skin lesions of this case were similar to those shown in photographs of Italian pellagra.

> "On the Ugie, a typical Simulium stream, near Peterhead, Aberdeenshire, we met several children presenting the peculiar skin lesions characteristic of pellagrin children after the subsidence of the eruptive stage."

The Slough case published by Dr. Box is next referred to with the probability that a dead brother had also died from pellagra, under the diagnosis of combined sclerosis of the spinal cord.

The authors conclude by stating that etiologically the presence of pellagra "in the United Kingdom is of importance, because here its causation cannot be reasonably explained by the consumption of either sound or bad maize, and its topographic distribution shows that here, as elsewhere, it is linked to the swift-flowing Simulium-infected streams." They suggest that investigation of the old case-books of our lunatic asylums will bring to light instances of overlooked pellagra and they entreat British physicians now to be on the look-out for mild forms of the disease.

F. M. S.

TREATMENT.

NILES (George M.). **The Treatment of Pellagra. Its Present Status.**—*New York Med. Jl.* 1913. Jan. 18. Vol. 97. No. 3. pp. 116-119.

Based upon experience gained in the care of more than 300 cases, the author classes his treatment under the four headings of hygiene, diet, drugs, and baths, leavened "at all times with a hopeful and helpful psychotherapy." He finds that alcoholic intemperance does more harm than in any other disease and counsels the avoidance of direct or indirect sunlight during the early spring months. He also believes in the action of heat and mentions the case of a female pellagrin who went into the kitchen and prepared one meal in the temporary absence of the cook; "she had shown no dermal signs of the disease for over two months, yet on the next day an acute erythema of the hands and face developed." His diet includes no maize, nor food made from maize; he praises meat and butter-milk and finds that the early diarrhoea, being mainly of central origin, does not require too limited a regimen. Though a strong believer in iron and arsenic subcutaneously and a combination of iodide and potash and Fowler's solution by the mouth, he does not consider that salvarsan is of value. He gives a solution of thymol or boroglycerine for the sore mouth, zinc ointment for the skin and treats intense burning sensations of hands and feet either with ice cold compresses of a weak solution of bichloride of mercury (for unbroken skin), or with baths of hot mustard water. It is sad to hear that "drainage of the gall bladder, appendicostomy and other surgical 'stunts' have their advocates," but the author condemns these procedures in mild terms. It is even more sad to read that a non-contagious disease has caused "a widespread pellagrophobia; when the unhappy victim finds most hospitals closed to him, while he is *persona non grata* in hotels and boarding houses, and where even nurses seem alarmed at its mere mention, can we wonder the knowledge of its presence fills the sufferer with dire forebodings?" Wisely and strongly the author pleads for cheerful suggestion and warm hearted encouragement from the physician and reminds pessimist doctors that when nothing can be done for a disease much can be done for the patient.

F. M. S.

MARTIN (E. H.). **The Specific Treatment of Pellagra. The Relative Value of Sodium Arsanilate and Salvarsan.**—*New York Med. Jl.* 1913. Mar. 15. Vol. 97. No. 11. pp. 547-550.

At Hot Springs, Arkansas, the author has treated during the last four year 83 cases of pellagra, from various States. 45 are excluded "on account of the data being insufficient for certainty." Of the remainder, 11 were treated with sodium arsanilate and nine recovered after two summers, while there were two deaths, one from chronic nephritis and the other from "cerebral complications." There remain 27 cases which were treated with salvarsan; of these 20 are apparently cured, three are doubtful and four ended fatally. The author's habit is to give to each patient doses of salvarsan varying in number from five to twelve at intervals of seven to ten days. The first dose was 0·2 gramme, the second 0·4 gramme, and subsequent doses were calculated on 0·1 gramme for every 20 pounds of the unclothed patient's weight.

The author holds that both syphilis and pellagra should be treated by giving intravenous doses of salvarsan until no reaction follows, by which he means no fever, no vomiting and no bowel disturbance. He finds that pellagra cases require twice as many doses as the syphilitic, and he is firmly of opinion that the reaction which he strives to produce is due to toxins released from killed organisms. After an experience of watching the results of 1,100 intravenous injections for syphilis he states that in at least a score of cases he has seen "patients with strictly tertiary lesions and with presumably not a single spirochaete in the circulating blood, changed to secondary cases after the administration of a dose of salvarsan, as shown by the prompt appearance of the secondary eruption, which, however, would disappear after or even before the next dose."

Of the four deaths after salvarsan "there seemed to be some connection" in three of them "between the reaction and a subsequent cerebritis or meningitis." The fourth death was considered by eminent consultants to be due to alcoholism, but it seemed to the author to be caused by a pellagrous explosion. He states that there seems to be but small choice between the two preparations of arsenic, except that sodium arsanilate must be given hypodermically during a period varying from eighteen months to two years.

He ends with an impassioned appeal to physicians of the Southern States not to continue to neglect the specific treatment in which he believes.

[There are very few clinical data and apparently no autopsies were made on the six fatal cases].

F. M. S.

DYER (Isadore). **The Treatment of Pellagra.**—*New Orleans Med. & Surg. Jl.* 1912. Oct. Vol. 65. No. 4. p. 310.

This is a short clinical note from New Orleans, inspired by "the wholesale belief in the incurability of the disease," which fortunately the author does not share. Among his theraupeutic items are:—

"In all cases, give diet containing, *every day*, one-half to one ounce of gelatin, cooked or mixed with the food. Give also, *every day*, the juice of two or more oranges or lemons, preferably between meals. Feed the patient well with eggs, milk and well-cooked mixed vegetables.

"Keep the patient out of the sun. Indoors, best from sunrise to sundown; out of doors, before sunrise and after sundown. This rule should be absolute.

"Daily baths in tepid or warm water, with a pound of starch (potato) added.

"Medication: Quinin hydrobromate, as much as ten grains every three hours where diarrhœa and mucous membrane irritation are bad; reduce the dose as symptoms improve, but give it throughout the attack—even all summer and all winter, if any signs of disease. Two or three grains, two or three times a day, will answer as a tonic dose.

"Give arsenic, strychnin, iron and other tonics as the case may indicate. None of these are specific, and the quinin seems to be."

F. M. S.

BODENHEIMER (J. M.). **A Family of Pellagrins.**—*New Orleans Med. & Surg. Jl.* 1912. Oct. Vol. 65. No. 4. pp. 319-320.

Four persons in Shreveport, Louisiana, out of two families consisting of eight individuals in one house, were found on examination to be pellagrous. All had been maize eaters, but the two husbands, who ate as much as or even more maize than their wives, showed no symptoms of pellagra. The youngest case was a baby of eighteen months who had the rash on its neck, feet and legs and slightly on the arms; also "bowel symptoms." The adults were apparently cured by five grain doses of soamin subcutaneously; a child of five years was similarly treated with three grain doses and the baby, who was fortunately still at the breast, was treated through the mother.

F. M. S.

MISCELLANEOUS.

ILLINOIS. **Report of the Pellagra Commission of the State of Illinois, 1911.**—250 pp. Illustrated. 1912. Springfield, Ill. Illinois State Journal Co., State Printers.

[The condensed report of this Commission has already been reviewed in this *Bulletin*, No. 6, pp. 300-301]. No less than

fifteen authors have contributed various chapters to this valuable report. Those in charge of the clinical and pathological part state that the great majority of cases showed an acute course with sudden onset. Another form is recognized in which the skin lesions disappear after a few weeks, the mouth and diarrhoea get well and yet "there is a gradual decline with increasing evidence of involvement of the nervous system until the picture becomes unmistakably that of central neuritis which ends fatally in a short time." [These are the cases which clinicians and pathologists who are unacquainted with pellagra cannot always accept as pellagra, even when they are told the previous history]. Peripheral neuritis is recognised by all as a possible sequela of diphtheria, but central neuritis is not yet universally accepted as the terminal result of severe acute pellagra. In 1901 A. MEYER described certain changes in the Betz cells of the motor cortex in a group of eight patients dying from exhaustion; these changes consisted in haziness of the protoplasm, displacement of the Nissl bodies and axonal degeneration. To this condition he gave the name of Central Neuritis. The eight patients came from the states of New York and Massachusetts and their chief symptoms were: emaciation, diarrhoea, exaggerated knee jerks, tremors, twitchings and contractions of the hands and forearms, delirium or stupor, without polyneuritis. MEYER had no knowledge of pellagra at the time and suggested that the changes were due to alcoholism or some other toxaemia. It is now thought by S. D. WILGUS and others that pellagra is one of the causes of central neuritis. The report is enriched by 24 illustrations of simulia and many tables detailing the results of many months hardwork.

The Commissioners find that the minimum standard ration for the insane should be for a man per day, 105 grammes, representing 3,150 calories, while a woman should be given 84 grammes of protein or 2,550 calories. Moreover 45 to 50 per cent. of the protein of the diet should be derived from animal foods such as meat, eggs, milk and other dairy products. They lay stress upon the diet being always varied and including an abundance of fresh fruits and vegetables and they determine that the food should be well cooked and served warm and attractively in a dining room which must be clean, well ventilated and pleasing in appearance. "Detailed study of the general diet of the Peoria State Hospital reveals a deficiency in protein constituents and especially in animal protein." It was in this asylum that 8·4 per cent. of the lunatics were pellagrous.

F. M. S.

SEPPILLI (G.). Sindrome Pellagrosa da Alcoolismo. [Pellagrous Manifestations due to Alcoholism.]—*Rivista Ital. di Neuropat., Psichiatria ed Elettroterapia.* 1912. Aug. Vol. 5. No. 8. pp. 345-347.

The Director of the Brescia lunatic asylum says that, like LOMBROSO and others, he has often noticed the association of pellagra with alcoholism. He now quotes two cases in which he

thinks that alcohol "independently of maize," gave rise to pellagrous symptoms.

1. A man, aged 30, in easy circumstances, the son of an alcoholic, had drunk (wine and a few liqueurs) to excess for about two years; he ate meat and other good food every day and "for years" he had not eaten polenta (maize porridge). In the second year of his eruption on hands and feet, he had loss of appetite and an acute mental condition, with confused hallucinations, which required his admission to the asylum in July. He was then found to have diarrhoea, a trace of albuminuria, tremulous hands and tongue, spastic paralytic gait and exaggerated knee jerks. In four weeks he had lost all his symptoms excepting the rash on the back of the hands.

2. A married childless woman, aged 46, one of whose brothers had committed suicide, while the other suffered from attacks of melancholia, had suffered for two years, in spring and autumn, from erythema of the hands and feet. In 1912 the rash was accompanied by giddiness, general exhaustion and loss of appetite. She ate good food of sufficient quantity and "very little maize," but she kept herself up by drinking wine and brandy. She was admitted to the asylum in July, with a history of religious delirium and hallucinations which had been present for a few days. This patient had similar symptoms to the first and, like him, lost them in the asylum. The author considers that maize food as a possible factor in the production of the symptoms in these two cases may be excluded.

F. M. S.

SANTAMARIA (J. M.). **Some Notes on Tropical Diseases Observed in the Republic of Colombia.**—*Jl. Trop. Med. & Hyg.* 1913. Apr. 1. Vol. 16. No. 7. pp. 100-102.

It seems evident that the following disease is pellagra, associated with alcoholism.

"*Chichismo* (Josue Gómez's Disease).—In some places in the cold climate (16° C.) the lower classes have an alcoholic drink called chicha, prepared in the following manner. Indian corn (maize), after being roughly ground, is left to ferment for some days in a warm place. It is then boiled from six to eight hours, and, after being strained, is mixed with molasses and water. This liquid must ferment for three days before use. As the quantity of alcohol in it is very small, people drink from two to three litres a day.

"The intoxication by chicha is very slow and the first symptoms appear after a year of its daily use. This is evidenced by erythema, localized in those parts of the body which have been exposed to the sunshine. Later on the intellectual capacities become stupefied, the knee-jerk is lost, the joints stiffen by contraction and walking becomes difficult and characteristic. The skin hypertrophies, loses all sensibility, and a persistent diarrhœa weakens the patient, who at last shows signs of mental weakness and dies. The disease is said only to be contracted by the chicha drinkers, although in Colombia a great quantity of Indian corn (maize) is eaten."

F. M. S.

Volpino (G.): **Ricerche sulla Pellagra. (Nota Riassuntiva.)** [A Note on Pellagra.]—*Pathologica.* 1913. Mar. 15. Vol. 5. No. 105. pp. 174-176.

The author, writing from Turin, states that the reaction of hyper-sensibility, produced by the intramuscular injection of a watery extract of bad maize, supplies a diagnostic help and shows, moreover, that there is a specific connection between maize-feeding and pellagra. The aqueous extract of healthy maize produces no appreciable reaction. His experiments on forty maize-fed animals seem to show an acquired hyper-sensibility towards a substance contained in pellagrous serum, and the conveyance of a living ultra-microscopic virus, capable of developing and multiplying itself, but only in those animals which are sensitive to the action of maize. He recognizes an analogy between beriberi, scurvy and pellagra and considers all three to be due to some deficiency of nutrition. He warns observers of the possibility of mistaking typhoid, paratyphoid fever, tuberculosis, pseudo-tuberculosis or dysentery for pellagra.

F. M. S.

Reed (H. S.). **The Effect of *Diplodia Zeae* and some other Fungi upon some Phosphorus Compounds of Maize.**—*New York Med. Jl.* 1913. Mar. 22. Vol. 97. No. 12. pp. 609-611.

The author, who is Professor of Mycology of Blacksburg, Virginia, has previously called attention to the presence of a fungus, *Diplodia zeae,* upon maize and to the possibility that this may play a rôle in the etiology of pellagra. The present paper was written to show the relative presence and possible significance of inorganic phosphates in maize inoculated with pure cultures of the mould fungus, and in samples of mouldy commercial corn. The chemical methods for extracting these phosphates are described in detail. Rabbits were injected with various by-products, and some feeding experiments were also carried out without producing any ill effects upon the animals, though it cannot be positively stated that these products are altogether non-toxic. It was found that infected corn lost from 55-60 per cent. of its original weight in 200 days and 47 per cent. in 92 days, a great loss of its food value. The alteration in the amount of contained P_2O_5 is important: in the top layers of a cargo of mouldy commercial corn the inorganic phosphorus content was between 2-3 times as great as in the less mouldy sample taken from ·20-50 cm. below the surface. It is possible that the mould fungi may use phosphorus compounds for their own metabolism, forming some specific compound characteristic for the particular fungus and that these phosphorus compounds if sensitive to light may have a pharmacological effect. The author suggests that the well known lesions of pellagra, which appear on portions of the skin exposed to light, might logically be due to some substance in the body of the pellagrin which is sensitive to light, and when acted on produces the local characteristic effects. This substance might be derived from the maize acted upon by the mould fungi.

F. M. S.

HELMINTHIASIS.

Bandi (Ivo). **A Contribution to the Study of Bilharziasis.**—*Jl. Trop. Med. & Hyg.* 1913. Mar. 15. Vol. 16. No. 6. pp. 84-85.

The results of an investigation carried out in Egypt in 1912 on the subject of bilharziasis are described. Material for pathological and parasitological researches were collected there and during the same year 25 cases of vesical bilharziasis were studied at Gafsa in Southern Tunis. In a sample of bilharzial urine preserved with formalin, received from Levy of Sfax, the author found in the centrifuged sediment schistosome ova with both terminal and lateral spines. These were scarce but he believes their presence is of some importance as regards the debated question whether the two varieties of ova belong to the same species of *S. haematobium* or not. Unfortunately during his sojourn at Sfax he was unable to trace the patient and so follow the case up. Referring to Conor's observations in Tunis, who saw a few cases of intestinal bilharziasis, the author states that in some of these ova of both varieties and in others only ova with terminal spines were seen.

The conclusions are that both ova with terminal and ova with lateral spines belong to the same species of *Schistosoma*, that is, that Looss's opinion is the correct one. [It is quite common to find ova with terminal and ova with lateral spines in the faeces in intestinal bilharziasis, but a rare event, or one might say an exceedingly rare event to find lateral spined eggs in the urine.]

G. C. Low.

Bassett-Smith. **Blood Determination in a Case of Katayama's Disease.**—*Brit. Med. Jl.* 1912. Nov. 2. No. 2705. p. 1208.

Blood examinations are described in a case of Katayama's disease (*Schistosoma japonicum*). The disease was contracted in June 1911 near Hankow, China, in the Yangtse Valley. The symptoms were confined to some irregularity of the bowels, followed by progressive anaemia and a certain degree of fever. The patient was sent home to England where he steadily improved. The blood counts were made during the latter part of 1911 and the early part of 1912. These showed a more or less normal red count, with a well marked increase in the leucocytes, 24,000 to 28,000. Differentially a very high eosinophilia was present, 40 to 60 per cent. During this time ova were found in small numbers in the stools. Very few clinical symptoms were then present and as the patient was feeling quite well he returned to his duties in the Navy.

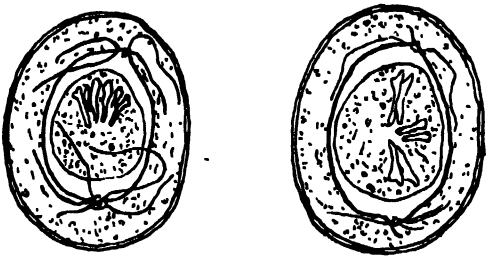
G. C. L.

Gerber (Isaac). **A Case of Infection with *Hymenolepis* (*Taenia*) *nana*, the Dwarf Tapeworm.**—*Boston Med. & Surg. Jl.* 1913. March 6. Vol. 168. No. 10. pp. 346-348.

This is the first case that has been reported from New England, while up to the present only 76 cases have been reported in

America. Symptoms pointing to the gastro-intestinal tract were practically absent, the only important one being nausea. On the other hand the nervous system was much disturbed, severe headache, dizziness, convulsions, and unconsciousness all being present. This agrees with what has been found in other cases. Facial oedema, a symptom noticed before in children, was also present and must have been either toxic or inflammatory in origin. A blood count showed eosinophilia and on account of this and the other symptoms trichinosis was suspected. An examination of the faeces however exhibited many characteristic ova of *H. nana* and cleared up the diagnosis. This, as Gerber points out, is often difficult to make, as ordinarily there are no symptoms pointing to an intestinal parasite and the tapeworms themselves are too small to be noticed in the stool with the naked eye, unless present in very large numbers, as after treatment. It can therefore only be made by a microscopical examination.

The ova, or more properly speaking "ōnchospheres," as they contain an embryo, are easily recognised. They have a thick double capsule, within which is found the embryo containing six hooklets. At either pole is a so-called mammilate tip, from which several filamentous appendages pass off into the surrounding protoplasm (vide diagram). It is the possession of these filaments that distinguishes the ovum of the *Hymenolepis nana* from those of other members of the same genus. The adult stage of the parasite measures only from 5 to 45 mm. in length with from 100 to 200 segments. It is the smallest tapeworm known to infect man and is usually a parasite of children. Most of the cases reported have been found either by routine stool examinations, for other purposes, or by examination of the stool on a mistaken diagnosis.



Ova of *Hymenolepis nana* found in faeces.
× 430.

In most cases the origin of the infection can be traced to food contaminated by the excrement of rats and mice. A stage in the rat, however, is not a necessary intermediate step in human infection, as infection from one person to another and also autoinfection are highly probable. The onchospheres when swallowed by rats have their capsules dissolved in the intestinal juices. The liberated embryos then bore into the intestinal villi, and there develop as the intermediate larva or cysticercus. Later these are said to be able to reach the lumen of the intestine and develop into adult worms which in turn discharge new onchospheres with the faeces. This same process probably occurs in man though this has not yet been definitely established. The fact, however, that some cases have lasted as long as three years in spite of several apparently successful courses of treatment seems to point to auto-infection from cysticerci which have been protected from the action of the drugs used. The only drug effective in the treatment is male fern.

G. C. L.

THIRY (G.). **L'Anguillule Stercorale** *Strongyloides stercoralis* **(Bavay, 1877), chez les Mineurs de Fer de la Lorraine.**—*Compt. Rend. Soc. Biol.* 1913. Mar. 7. Vol. 74. No. 9. pp. 500-501.

In 1909-1910 the author conducted an enquiry into ankylostomiasis in the iron mines of Lorraine. He examined twenty per cent. of the miners in thirteen mines, at Briey, Longwy and Nancy, in all a total of 745 people. Of this number 1·209 per cent. had ankylostome eggs, and 0·940 per cent. embryos of *Strongyloides stercoralis* (Bavay, 1877), *i.e.*, 7 out of the 745. He believes the infection was introduced from abroad by a Frenchman who had travelled in China and by six Italian miners. Of the latter one had been on a coffee plantation in San Paolo, Brazil, and harboured ankylostomes also. Thiry notes the fact, commented on by PERRONCITO in 1880, that strongyloides and ankylostomes are often found together in the same person. The parasite is apparently not indigenous in France, its introduction from without being specially emphasised.

G. C. L.

JOHNSON (L. F.). **Hookworm Disease. Pathology and Diagnosis.** —*Texas State Jl. of Med.* 1913. Mar. Vol. 8. No. 11. pp. 303-305.

The author began to study ankylostomiasis four years ago, and since that time has investigated 241 cases. He describes some of these under the headings, typical and atypical. The symptoms of some of the latter were very obscure and the diagnosis was only cleared up by the discovery of the characteristic ova in the faeces. For finding these, centrifuging the faeces with water or the use of BASS's method is recommended.

[This method, which is a valuable one, is as follows:—A quantity of faeces is well diluted with water, 1:10, and strained through gauze to get rid of coarse particles. It is then centrifuged and the fluid poured off, the centrifuge tube being refilled and centrifuged again until all the diluted faeces have been used. The precipitate is rewashed several times with water as long as anything can be washed out. Calcium chloride solution of a specific gravity of 1050 is now added and the precipitate washed as before. This salt, which was suggested by METZ, is preferable to others because of its hygroscopic properties, and its addition to the faeces disposes of everything having a specific gravity below 1050. The precipitate is now examined, and will be found to contain most of the eggs which were present in the original amount of faeces used and may all be put on one slide for examination. One such slide contains as many eggs as can be found in several hundred ordinary slide preparations of faeces. In some instances, after washing with the calcium chloride solution, a considerable amount of material, much of which is heavier than the eggs and of such a character that it interferes with their recognition, may be present. In such a case, this material may be removed by centrifuging with a fluid of greater weight than the eggs. A solution of calcium chloride with a specific gravity of 1250 is very satisfactory, the eggs going to the top in this and other material to the bottom. For examination a few drops from the surface may be removed and examined with an appropriate pipette or some of the top fluid containing the eggs may be poured off, diluted with water to bring the specific gravity below 1050, and centrifuged again.*]

G. C. L.

Peiper (Otto). Über den Infektionsmodus der Ankylostomiasis in Deutsch-Ostafrika. [On the Mode of Infection in Ankylostomiasis in German East Africa.]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1912. Oct. Vol. 16. Beiheft 6. 34 pp. [pp. 537-570.]

In this paper the author gives the results of a series of carefully carried out observations which he conducted for the purpose of determining how the ankylostome enters the human body in German East Africa. For this purpose he examined sand, earth contaminated with bath water, drinking water, earth from latrines, etc., and noted whether or not larvae were present. As a result of these examinations he concludes that earth or mud eating is not a factor in the production of ankylostomiasis, because the earth, after its preparation, cannot be seen to be infected. The earth contains no salt; therefore it is not consumed for that reason.

In a certain small percentage of cases infection takes place by the mouth by the drinking of water containing larvae, or by the use of raw vegetables, but the usual mode of infection is undoubtedly by way of the skin, the larvae being either brushed off the damp grasses, or taken up from the infected soil by the feet.

The author details certain steps, based on his results, which he thinks should be adopted for the prophylaxis of the disease in German East Africa. Amongst the most important of these are the proposal of a monthly or quarterly examination of the soldiers, police, carriers, servants and natives generally, periodical disinfection of latrines with milk of lime or hot water, and a gradual training of the natives in order to make them develop more sanitary habits.

G. C. L.

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* See *Archives of Internal Medicine.* 1909. June. Vol. 3. p. 446.

BASS (Charles C.). **The Human Intestinal Parasites Common in the United States.**—*Interstate Med. Jl.* 1912. Vol. 19. No. 3.

The author briefly discusses the intestinal worms commonly infecting man in the United States. Of nematodes *Strongyloides intestinalis, Trichuris trichiura, Ascaris lumbricoides, Oxyuris vermicularis* and *Necator americanus* were met with. As regards tape worms practically only two varieties occur in the United States, *Taenia saginata* and *Hymenolepis nana*. *T. solium* and *Dibothriocephalus latus* though rare have, however, been found. The usual methods for examining the faeces are given. These are the direct microscopical examination or the method of examination after centrifuging. [See above.]

G. C. L.

JAMISON (Stanford Chaillé). **Intestinal Parasites in Costa Rica.**—*Jl. Trop. Med. & Hyg.* 1913. Mar. 1. Vol. 16. No. 5. pp. 69-70.

Of 210 patients examined only 42 gave negative results. The majority of these negative stools were subjected to not less than three careful examinations, and the centrifugal method was repeatedly used. A few of the cases, however, left the hospital before more than one examination could be made. Of the patients about whom data were obtained, fourteen had been in Costa Rica less than one year, nine between one and five years, four for life, while in twelve cases of Jamaica-born negroes the length of residence could not be obtained, though it was probably less than five years. Eleven were Americans and English who had been in the country less than a year; six were negroes from the island of St. Kitts resident for less than three years; nineteen were negroes from Jamaica resident for a few months to 25 years, and four were native-born Costa Ricans who had never been out of the country. Of this number 169 cases or nearly 80 per cent. were positive for some intestinal parasite. *Trichuris trichiura* was by far the most common infection, but in addition *Strongyloides intestinalis, Necator americanus, Ascaris lumbricoides* or *Oxyuris vermicularis* were met with. Many of the cases harboured more than one of these parasites. [Apparently cestode and trematode eggs were never met with; no information as regards the presence or absence of *Ankylostoma duodenale* is given.]

G. C. L.

MILLOUS (P.). **Helminthiase intestinale à Thanh-hoa.**—*Bull. Soc. Méd.-Chirurg. de l'Indochine.* 1913. Mar. Vol. 4. No. 3. pp. 157-158.

The author has examined 1,000 stools of natives of the province of Thanh-hoa, Indo-China. The results are very similar to those obtained by MATHIS and LEGER in North Annam, but shew on the whole a feebler infection. The latter observers found distome eggs in two out of 45 examinations, but Millous did not encounter such eggs in any of his cases. The two tables reproduced below demonstrate his results at a glance.

Association of parasites.

Months of 1912.	Number of stools examined.	Number of persons infected.	Percentage of persons infected.	Stools containing parasites.									
				418 containing 1 parasite.				137 containing 2 parasites.				14 containing 3 parasites.	3 containing 4 parasites.
				Ascaris.	Trichocephalus.	Ankylostome.	Oxyuris.	Ascaris trichocephalus.	Ascaris ankylostome.	Trichocephalus ankylostome.	Ascaris oxyuris.	Ascaris, trichocephalus, ankylostome.	Ascaris, trichocephalus, ankylostome, oxyuris.
August ...	97	22	23	6	1	2	1	1	6	—	—	4	1
September	70	38	54	10	6	6	—	4	4	3	—	4	1
October ...	92	53	69	14	3	11	—	6	13	6	—	—	—
November	346	201	56	96	53	16	—	21	9	3	—	3	—
December	405	258	63	118	63	9	3	46	12	—	3	3	1
Total ...	1,010	572	57	244	126	44	4	78	44	12	3	14	3

Monthly distribution.

—	Number of persons examined.	Ascaris.		Trichocephalus.		Ankylostome.		Oxyuris.	
		No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
August ...	97	18	18	7	8	13	14	2	—
September ...	70	23	32	18	25	18	25	1	—
October ...	92	33	35	15	16	30	32	—	—
November ...	346	129	37	80	23	31	11	—	—
December ...	405	183	45	113	27	25	6	7	—
Total ...	1,010	386	39	233	23	117	11	10	1

[The figures in Table I are not correct in the original; they have been revised and corrected in the translation.]

G. C. L.

Schüffner (W.) & Vervoort (H.). **Das Oleum chenopodii gegen Ankylostomiasis und eine neue Methode der Wertbestimmung von Wurmmitteln.** [Oleum chenopodii for Ankylostomiasis and a new Method of Estimating the Value of Vermifuges.] —*Münchener Med. Wochenschr.* 1913. Jan. 21. Vol. 60. No. 3. pp. 129-131.

Oleum chenopodii anthelmintici is a volatile oil prepared from *Chenopodium anthelminticum* L., a member of the Nat. Ord. Chenopodiaceae, and is official in the U.S. Pharmacopoeia. It has been used there in the treatment of round worms in a dose of 3 minims, given either on sugar or made up in an emulsion. The authors after experimenting with thymol, naphthol, oleum eucalypti, and oleum chenopodii in the treatment of ankylostomiasis have reached the conclusion that the latter is more energetic in its action than any of the others. Its only disadvantage is its price, the cost for a single cure being double that of thymol and eucalyptus and four times that of naphthol. They gave it in doses of 16 minims, three times repeated, in the course of two hours and followed this up with a dose of castor oil and chloroform two hours after the last dose.

G. C. L.

ARTAULT (S.). **Le Thymol contre le Taenia.**—*Bull. Général de Therapeutique.* 1913. Feb. 23. Vol. 165. No. 7. pp. 267-269.

A course of thymol is recommended for the expulsion of taenia. Cachets containing 25 centigrammes are given in the morning on an empty stomach, for some days. The worm is usually expelled on the third or fourth day, but in order to make absolutely certain the treatment is carried on until the eighth day. The procedure is simple and the patients bear the drug perfectly. Up to the present the author has treated 23 cases by this method, in all of which the taenia was expelled without any recurrence. During the treatment all alcohol is stopped.

G. C. L.

HERRICK (W. W.). **Experimental Eosinophilia with an Extract of an Animal Parasite. Its Relation to Anaphylaxis and certain Clinical Problems.**—*Arch. Internal Med.* 1913. Feb. 15. Vol. 11. No. 2. pp. 165-186.

The functions of the eosinophile cells remain one of the mysteries of biology and little is known of the role they play in the economy of the body. The problems towards which the author directed his attention were as follows:—

"1. Whether eosinophilia of the blood could be produced experimentally by the use of an extract of *Ascaris lumbricoides*. 2. Under what conditions of administration of this extract such eosinophilia might be brought about. 3. Whether or not the substance influencing the eosinophils is a protein. 4. Whether such eosinophil increase bears any relation to specific sensitization or anaphylaxis." Throughout the work the possible relationship of these questions to the clinical problem of bronchial asthma was also kept constantly in mind.

After a long series of experiments with guinea-pigs and numerous blood examinations, the author has reached the following conclusions:—

"1. A notable eosinophilia of the blood can be developed by the intraperitoneal injection of an aqueous extract of *Ascaris lumbricoides*.

"2. The substance causing such eosinophil increase is a protein.

" 3. Previous sensitization is necessary to the development of this eosinophilia.

" 4. It is impossible to produce such eosinophilia while the animals are immune to the extract.

" 5. This eosinophilia may therefore be considered evidence of previous sensitization.

" 6. There is a possible association of these facts with the problem of bronchial asthma."

G. C. L.

WEINBERG (M.). (i) **Helminthic Toxins.**—*Brit. Med. Jl.* 1912. Nov. 2. pp. 1206-1207.

(ii) **Toxines Vermineuses. Rapport présenté au Premier Congrès International de Pathologie Comparée** (Paris, Octobre 17-23 1912).—*Bull. Inst. Pasteur.* 1912. Nov. 30. Vol. 10. No. 22. pp. 969-977; Dec. 15. No. 23. pp. 1017-1026; & Dec. 30. No. 24. pp. 1065-1072.

Weinberg writes that the studies of many French and foreign authors, on the part played by intestinal parasites in the etiology of appendicitis and of infectious diseases in general, have established definitely: (1) that helminths inoculate microbes into the wall of the intestine or into the organs they penetrate and (2) that the frequency of such inoculations and the seriousness of the infection set up depend mainly on the buccal structure of the parasite and the nature of the host's intestinal flora. The importance of these researches caused some neglect of the study of the secretion, by the parasites, of toxins and the reaction of the organism following on their absorption. Von LINSTOW, E. PERRONCITO and R. BLANCHARD brought before the eighth International Veterinary Congress (Buda Pest 1905), a number of facts in support of the toxic action of intestinal parasites, but precise data on this subject have been gathered only within the last few years.

Clinicians established the first knowledge of the toxic action of helminths. By careful study of certain cases they shewed, by methods of elimination, that symptoms such as anaemia and eosinophilia could only be explained by the presence of the numerous worms with which the patients were infected. Experimental research has confirmed clinical evidence and there exists now a collection of definite facts which shew that the parasites do secrete in truth poisonous products. The proofs of the existence of these toxins can be grouped into:

(i) *Indirect proofs*—By this is meant all the experimental and anatomo-clinical evidence which shew that the presence of intestinal worms is accompanied by certain changes in the organs and blood of the patient.

(ii) *Direct proofs*—obtained by researches on the toxic action of extracts of the parasites and especially of fluids secreted by the parasites, *e.g*, hydatid and cysticercus fluids, the perienteric fluids of Ascarids, and the fluid of *Coenurus serialis*. These fluids, when proper precautions are taken, can be procured free of foreign matter and absolutely sterile. Weinberg gives an exhaustive summary of the records of experimental work and clinical observation on the nature and action of helminthic toxins. He describes and reviews these researches, including his own, under the headings—Indirect Proofs, Direct Proofs, Haemotoxins, Toxicity of Fluids from Parasitic Cysts, Ascarid toxins, Taenia toxins, and Bactericidal Properties of Helminths.

Some authors have denied the existence of helminthic toxins on account of the fact that some carriers of filariae and bilharzia appear to enjoy good health. We, however, possess very little knowledge of the biological reactions of the blood of these subjects. It is more than probable that helminths in the human blood produce harmful effects on the host. It can no longer be doubted that all helminths secrete substances that have a toxic effect on the organism of the host. According to the parasite, so its secretion differs in its degree of toxicity and its mode of action. The lesions provoked depend not only on the number of parasites, their localisation and the amount of toxin absorbed, but also on the individual sensitiveness of each subject infected.

The helminthic toxins have in common the property of acting on the haemopoietic organs.

Helminthiasis is above all characterised by the existence of a more or less intense poisoning of the host organism by toxic parasitic products.

Besides this poisoning there occur also symptoms appropriate to each species, according to the localisation of the worms in different organs and their manner of attachment.

There were the functional troubles set up when the parasites occupied certain situations; the mechanically produced lesions, often considerable, due to parasites with powerful buccal armature, and finally the microbial infections, sometimes fatal, in the production of which intestinal worms often played an indisputable part.

Serious as these accidents are, they are only secondary complications which serve to mask in some cases the symptoms of helminthic poisoning.

H. M. Hanschell.

ERRATUM.

Bulletin No. 8 (February 28, 1913), p. 432, line 11 from top, and p. 440, line 3 from bottom, for *Schistosomum* read *Schistosoma.*

CHOLERA.

ARCHIBALD (R. G.). **A Case of Choleraic Diarrhoea caused by an Organism of the *Bacillus Proteus* Group.**—*Jl. R. Army Med. Corps.* 1913. Feb. Vol. 20. No. 2. pp. 157-161.

The stools of a case with severe intestinal symptoms greatly resembling cholera gave no vibrios but almost pure cultures of a short Gram-negative motile non-sporing bacillus, which did not ferment lactose, cane-sugar, dulcite, adonite, inulin or raffinose, but produced acid and gas in glucose, mannite, laevulose, maltose, galactose and dextrin. Milk was at first turned acid without clot formation, but by the 3rd day became and remained alkaline; Voges-Proskauer reaction positive; blood-serum not liquefied. It was pathogenic for guinea-pigs and rabbits intraperitoneally (0·2 cc. of broth culture killing a rabbit in 12 hours with intense local congestion). Subcutaneously and orally it was not virulent for either. The patient's serum did not agglutinate this or any other organism of the typhoid-colon group. The cultures had an offensive odour, gave a strong indol reaction, and on Drigalski-Conradi showed fluorescence. The writer looks on this organism as an aberrant member of the *B. proteus* group.

J. Henderson Smith.

MANCINI (Stefano). **Ueber einen mit Cholera komplizierten Fall von Paratyphus B.** [Case of Paratyphoid B. Infection complicated by Cholera.]—*Wien. Med. Wochenschr.* 1913. Mar. 15. Vol. 63. No. 12. pp. 751-752.

An account of a case which at first presented the symptoms of an intestinal infection of uncertain nature, but of which the serum agglutinated Paratyphoid B. in dilution of 1/600 (not typhoid, coli or para-typhoid A.). Subsequently symptoms of cholera appeared and the patient died of the latter disease. The first signs of cholera appeared 9 days after the earlier condition had developed, and Mancini believes he can exclude any infection with cholera for the 7 days preceding its appearance. He accordingly thinks the patient must have been a cholera carrier and that the disturbance of the intestinal equilibrium by the Paratyphoid attack brought about the development of the vibrios. The cholera diagnosis was confirmed by the isolation of the culturally and serologically typical vibrios from the stools: the patient's serum never agglutinated them. The first symptom of the new invasion was the drop in temperature, and it is of interest to note that shortly before this symptom appeared the number of red corpuscles had fallen from 3,820,000 one week previously to 2,300,000, possibly from haemolysis, and the leucocytes rose from 6,450 to 12,000.

J. H. S.

Csernel (Eugen). **Beiträge zur sogenannten Mutation bei Choleravibrionen.** [On the So-called Mutation of Cholera-Vibrios.] —*Centralbl. f. Bakt.* 1. Abt., Orig. 1913. Mar. 1. Vol. 68. No. 2. pp. 145-150.

The author, who did not obtain the regular correspondence between type of colony and morphology of organism described by Baerthlein, looks upon the differences in different colonies on one and the same plate as evidence of degenerative changes rather than a genuine mutation. The same changes occurred later on plates which at first showed colonies of only a single type, and the only difference between the mutative and the degenerative changes, according to the author, lies in the time of their appearance. Papillae were observed on old cholera plates.

J. H. S.

Mazzetti (Loreto). **Beitrag zum Studium des Stoffwechsels der Choleravibrionen.** [On the Metabolism of the Cholera Vibrio.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1913. Mar. 1. Vol. 68. No. 2. pp. 129-145. With 3 figs.

A systematic study of the nitrite and indol production of cholera vibrios. In simple peptonised water cholera will produce in 48 hours much more nitrite than could be obtained from any nitrate impurity in the medium. The presence of nitrates favours very markedly the nitrite production, but within the limits of 0·25 to 1·0 gr. nitrate per 100 cc. the amount of nitrite produced is independent of the quantity of nitrate, and larger amounts reduce the nitrite yield, apparently by checking the full growth of the organisms. A recently isolated strain was a much more efficient reducer of nitrates than one long out of the body.

The addition of nitrite to the medium does not prevent the further production of nitrite, in part perhaps derived from the nitrates contained in the nitrite solution added; but if the addition reaches a certain limit, the organisms produce no more although they still develop and produce indol. Addition of both nitrite and nitrate at the same time does not prevent a further production of nitrite, the amount of this production, however, being within limits inversely proportional to the nitrite added, and does not much exceed the amount produced when no nitrates are present.

Indol is demonstrable in simple peptone water in 6 hours and reaches a maximum in 42 hours. Its presence, however, cannot be demonstrated in solutions which contain nitrate to more than 0·4 per cent. or nitrite to more than 0·25 per cent. If the red colour has already been elicited in a culture, the addition of nitrate does not destroy it, but on addition of nitrite the colour disappears. The distillate of peptone-water cultures gives the indol reaction, although no nitrite can be found by the reaction of Gries.

J. H. S.

Pane (Domenico). **Vitalità del Vibrione del Colera a contatto con gli Acidi.** [Viability of Cholera Vibrios in contact with Acids.]—*Riforma Medica.* 1913. Feb. 22. Vol. 29. No. 8. pp. 197-198.

During the 1911 Naples epidemic Pane noticed that the alkaline character of the stools usually found in carriers or convalescents disappeared with the disappearance of the vibrios. Only rarely were vibrios present when the stools were acid, though in one case of a carrier the acid reaction was intense. Growth of cholera in peptone water is inhibited by the presence of sufficient acid. Mineral acids are about equally effective in this respect, but organic acids are some much more and some much less effective than mineral acids. No increased resistance to the action of acid was obtained by growing the organisms for a month in peptone-water to which acid had been added in quantity just too small to stop the growth. The vibrios may remain alive in peptone-water containing acid enough to prevent multiplication, *e.g.*, in HCl or caprilic acid, and the viability is considerably increased by the presence of fats, which according to Pane act mechanically by forming a protective envelope or coating round the organisms.

J. H. S.

de **Bonis** (V.) & **Natale** (P.). **Immunizzazione delle Cavie col Nucleo-proteide dei Vibrioni colerigeni per la Via gastrica.** [Immunisation of Guineapigs by Oral Administration of Cholera Nucleoproteid.]—*Riforma Medica.* 1913. Feb. 8. Vol. 29. No. 6. pp. 141-143.

A preparation of nucleoproteid was made from virulent cholera vibrios, grown for a few days in broth at 37° C., by adding to the culture caustic potash up to 1 per cent., acidifying with acetic acid, precipitating with ammonium sulphate and after washing the precipitate drying it over sulphuric acid. Given intraperitoneally the culture killed 2 kilo. rabbits in a dose of 0·1 cc. of 24 hour broth culture, and 1 mgr. of the nucleoproteid killed 250 gr. guineapigs. Dissolved in 0·5 per cent. sodium bicarbonate the nucleoproteid was given to 11 guineapigs by the stomach through a sound. The quantity given at one time varied from 0·5 to 2 cgr., and the intervals between injections varied from a few days to a month. Six animals received 3 injections in all, 3 received only 2 injections, and 2 only one injection. Of the 11 guineapigs 6 died within 10 days of the last injection, 2 survived (both having received 1·5 cgr. in 3 injections), and the other 3 died 15, 23 and 36 days respectively after the last injection. The serum of 9 of the animals contained agglutinin, the highest titre obtained being 1/1000 in 2 animals and 1/500 in 4 animals. The 2 animals which survived were given 0·25 cc. of a 24 hour broth culture and both survived, a control animal dying in 48 hours.

J. H. S.

NIJLAND (A. H.). **Weder eenige Resultaten met het Choleravaccin Verkregen.** [Further Results with Cholera Vaccine.]—*Geneesk. Tijdschr. v. Nederlandsch.-Indië.* 1913. Vol. 53. No. 1. pp. 1-12.

The statistics which have been hitherto published of the results obtained with cholera-vaccine in the Dutch East Indies have been all highly favourable, with a single exception. LEOPOLD at Stagen (Borneo) found a higher percentage of cases among the vaccinated than the unvaccinated. The explanation of this aberrant result is now supplied by Nijland, who ascertained that not only were the figures actually given inaccurate (as is admitted by LEOPOLD) but that the arrangements for carrying out the inoculations were inadequate. Attempts are constantly made by the natives to get their names on the register as inoculated without their having been vaccinated at all, and offers are made to bribe even European officials. The extent to which this evasion is attempted may be inferred from the instance of a convict prison, where a system was adopted of secretly marking the skin of each person as he was inoculated. Among one group of 500 persons, who were not inoculated and did not carry this mark, as many as 40 were found when brought up for vaccination to have simulated the mark made by the iodine and needle prick of the usual technique. Statistics therefore may be very misleading, unless special care is taken to prevent any evasion, and the Stagen figures are quite unreliable. Nijland gives further unpublished figures with respect to cholera vaccination. In a convict quarter at Glodok, of 2,400 persons 45 took cholera in 1911 (when vaccination was imperfectly carried out), and 30 died; while in 1912 (after thorough vaccination) only 2 cases occurred with 1 death, although elsewhere the disease was equally prevalent in the two years. Among the European population of Batavia, 8,000 persons were vaccinated, among whom 3 cases occurred (one developed the disease 2 days after inoculation and died), while among the 2,700 unvaccinated 32 cases occurred with 15 deaths.

J. H. S.

SEGALE (Mario). **Ricerche Anatomopatologiche, Batteriologiche e Biochimiche su tre Feti di Colerose.** [Pathological, Bacteriological and Biochemical Examination of three Foetuses of Choleraic Mothers.]—*Pathologica.* 1913. Apr. 1. Vol. 5. No. 106. pp. 200-204.

In three cases Segale examined the foetuses delivered dead from mothers suffering from rapidly fatal cholera. One of these was a primipara, the others multiparae, and in all three pregnancy had passed the 8th month. There was reason to believe that in all the foetus was not long dead at the time of delivery and that the material was fairly fresh. Cultures were made from the foetal blood in two cases and from the intestine in all, but they remained sterile. The chief points observed by post-mortem and histological examination were subpleural and subpericardial ecchymoses in all of the cases, marked degenerative changes in the liver and kidneys, haemorrhage or haematoma in the suprarenals and some clear watery fluid in the intestine. The serum in 2 cases was extremely toxic, 0·25 cc. killing a guineapig in less than half an hour; the freezing point of the serum and its refractive index were lowered. Segale considers that the facts point to an intoxication of the child by poisonous products elaborated in the mother, with possibly an added asphyxia due to the congested condition of the maternal organs. There was no evidence of an infection of the foetus by the vibrios in any case.

J. H. S.

SCHIAVONE (A.) & TREROTOLI (G.). **Sull' Azione dei Raggi Ultravioletti sui Vibrioni del Colera e sui Bacilli della Peste.** [Action of Ultra-Violet Rays on Cholera Vibrios and Plague Bacilli.]—*Riforma Medica.* 1913. Mar. 15. Vol. 29. No. 11. pp. 288-291.

A dense emulsion of cholera vibrios in various suspension fluid was exposed in a layer 2-3 mm. thick to the action of a mercury lamp (Haereus pattern, Westinghouse make), worked with a tension of about 75 volts at about 20 c.m. distance from the organisms. The fluids used were physiological saline, broth, urine, milk, and blood serum. Samples were withdrawn from time to time and inoculated on broth or agar. Cholera was killed in about 1 minute in saline, but in the fluids containing organic matter the time required for sterilisation was much longer, viz., 30 min. in serum, and 2 hours or more for urine, milk, and broth. (Plague bacilli were killed in 6 to 10 min. in saline, in 15 min. in broth, 1½ hours in urine, 2½ in milk, and over 3 hours in serum.) Small pieces of cotton or wool dipped in salt solution emulsions of the organisms were readily sterilised, especially if first the one side of the material and then the other was exposed to the rays (time about 5 to 15 mins.). These experiments do not support the contention that the use of ultraviolet rays is a practical method of sterilising colloidal or organic fluids.

J. H. S.

KRAUS (H.). **Ueber Massnahmen zur Bekämpfung der Cholera auf dem bulgarischen Kriegsschauplatz.** [Cholera Measures on the Bulgarian War Front.]—*Wien. Klin. Wochenschr.* 1913. Feb. 13. Vol. 26. No. 7. pp. 241-247.

Towards the middle of November the Third Bulgarian army was attacked at the Tschataldja lines by an epidemic of intestinal disease. The epidemic was of extremely sudden onset, and by the 18th November the total number of cases had reached 17,000 with 900 deaths, and by 30th November, 29,626 cases with 1,849 deaths. Cholera vibrios were found in the stools and identified by cultural and agglutination tests, and no other pathogenic organisms were met with; but Kraus considers that the low mortality of 6 per cent. makes it certain that not all of these cases can have been cholera and that many were simply enteritis due to chill or imperfect food supply. What proportion of the cases were really cholera cannot be determined from the relatively small number of cases examined. Whatever its nature the epidemic appears to have been water-borne, but in the hospitals for the wounded sporadic cholera cases were occurring all the time.

Kraus's expedition, which was meant to organise the sanitary arrangements on the Bulgarian side, started only on the 19th November when the epidemic was already at its height. His first step was to establish a series of diagnosis laboratories, of which nine were set up between the front and Sofia. Then he tried to limit the spread of the epidemic. The use of unboiled water was forbidden, first to the troops at the front and later to the other troops; and some attempt was made to segregate the sick and the wounded into two main groups. The first division was made at the front, the severely wounded being drafted into hospitals reserved for wounded only, and the sick into separate hospitals. Naturally it was impossible to examine all the wounded to see whether they were carriers or not, and sporadic cases of cholera kept occurring in the hospitals for the wounded. This risk of contact-infections, with the danger of invalided soldiers carrying the disease through the whole country, was so serious, that eventually all the wounded were vaccinated against cholera as a routine measure.

Civil cases began in the first part of December, but the epidemic subsided very quickly towards the middle of the same month. To what extent this can be attributed to the measures taken does not appear from the sketch given in this paper, and the effects of the treatment adopted will no doubt be adequately considered later on. Kraus is so afraid of a recrudescence of the epidemic in summer that he has strongly urged the vaccination of the whole Bulgarian population in spring. Certain facts of importance for military hygiene come out clearly even in this paper. In particular, the urgent necessity of diagnosis laboratories up at the front, if the current view of the nature of cholera epidemics is maintained, is emphasised, and above all the necessity of making preparations during peace for the inevitable epidemics of war.

J. H. S.

VAN DIJKEN (H. W. J.). **De Behandeling der Choleralijders in het Militair Hospitaal te Weltevreden tijdens de laatste Epidemie.** [Treatment of Cholera Patients in the Military Hospital at Weltevreden during the last Epidemic.]—*Geneesk. Tijdschr. v. Nederlandsch.-Indië.* 1913. Vol. 53. No. 1. pp. 32-52.

24 cases of cholera in the algid state were treated solely by intravenous injections of hypertonic salt solution (Rogers' formula), with 9 deaths, *i.e.*, 37·5 per cent. Full details are given and the author is very favourably impressed by the method of treatment.

J. H. S.

DYSENTERY.

AMOEBIC DYSENTERY.

CARINI (A.). i. **Phagedenismo Cutaneo Amebico.** [Amoebic Phagedaena of the Skin.]—*Rev. Med. de S. Paulo.* 1912. Aug. 31. Vol. 15. No. 16. pp. 315-316.
ii. **Um outro Caso de Phagedenismo Cutaneo Amebico.** [Another Case of Amoebic Phagedaena of the Skin.]—*Ibid.* pp. 316-317.

An Italian engineer, aged 37, fell ill with the usual symptoms of liver abscess. After the symptoms had continued for three months the abscess was opened in hospital in the usual manner, and in the pus numerous motile amoebae were found. A week afterwards a second abscess was evacuated. The skin round the operation wound soon took on an unhealthy appearance, becoming dark grey in the centre of the area with a zone of inflammation outside. Fistulae formed in the subcutaneous tissue, from which there exuded, on pressure, a chocolate-coloured pus similar to that of liver abscess. Gangrene of the skin followed over a surface measuring 5 × 10 centimetres, and the whole of this infected area was ultimately dissected off down to the level of the muscles by the surgeon in attendance, leaving an oval wound measuring 16 × 15 centimetres with the original operation wound in the centre. The surface was then dressed with a solution of sulphate of quinine. With this the denuded area soon took on a healthy action in spite of a continual discharge of pus from the original liver abscess. The patient eventually recovered with a large cicatrix. The author finds by enquiry that this complication of liver abscess is not unknown to surgeons practising in Brazil, though it receives but scanty notice in books. It is generally regarded by the local surgeons as a very fatal complication.

ii. The author since the date of his first communication has come upon a second case of the same affection. The patient was only seen a few hours before death.

An Italian labourer, aged 30, suffered for about a year with persistent bloody dysentery, loss of flesh and fever. A large abscess eventually was located in the right lobe of the liver, and was opened. After the operation the state of the patient continued bad, from persistence of the dysentery. Two or three weeks after the operation the surgeon in attendance noticed that the edges of the wound had assumed a dark grey tint and had begun to necrose. At the reporter's visit, a week after the supervention of the complication, ulceration of the skin had extended over an area of 10 × 8 centimetres. Gangrene had penetrated down to the muscles and the patient was in extremis.

Smears of pus taken from the affected areas in both these cases, and stained, showed amoebae presenting the characters of *Amoeba tetragena*, while sections of the skin revealed the further presence of the same parasite.*

S. R. Douglas.

*** This case would appear to be that described in this *Bulletin*, No. 8, p. 455.**

PFLETSCHINGER (F.). **A Case of Amebic Colitis.**—*The Post Graduate.* 1913. Jan. Vol. 28. No. 1. p. 54.

An account of a case showing symptoms of dysentery and hepatitis, but in which repeated examinations of the stools failed to show amoebae.

The patient at first improved under general treatment, but a relapse occurred, and on again examining the stools amoebae were found. Treatment with salol-coated ipecacuanha pills was then commenced, the doses given being 60 to 10 grs. of ipecacuanha, and the patient rapidly recovered.

S. R. D.

PAVIOT (J.) & GARIN (Ch.). **Étude sur la Dysenterie Amibienne Autochtone.**—*Jl. de Physiol. et de Pathol. Générale.* 1913. Mar. 15. Vol. 15. No. 2. pp. 342-350.

The account of a fatal case of amoebic dysentery in a patient who had never been out of France, and who had never served in the army, is given.

Amoebae were discovered in the stools, both free and encysted, in large numbers. Two kittens were injected per rectum with the stools containing amoebae: one of these died 22 days afterwards with all the symptoms of dysentery, amoebae being found in the stools from the third day after the injection, the symptoms of dysentery not appearing till the tenth day; the other kitten did not develop any symptoms of dysentery, but amoebae were found in the stools from the fourth to the twelfth day after the injection.

At the commencement of the paper references are given to several cases in which the patients suffered from amoebic dysentery although they had never been out of Europe.

The case described by the authors is the fourth that has been observed in Lyons.

S. R. D.

FIELD (F. E.). **Notes on a Case of Liver Abscess.**—*British Guiana Medical Annual for* 1911. Part 2. p. 72.

An account of a case of liver abscess seemingly not due to amoebae.

There was no history of dysentery or injury but the patient, a negro aged 40, stated that he had had syphilis; pain in the abdomen had been a constant symptom for eighteen months, sometimes so severe as to make manual labour impossible and had become much more severe after a strain.

The abscess was opened and recovery was rapid; no amoebae or micro-organisms were discovered in the pus.

S. R. D.

ABBATUCCI. **Le Signe du "Flot transthoracique" et les grands Abcès du Foie.**—*Ann. d'Hyg. et Méd. Colon.* 1912. Oct.-Nov.-Dec. Vol. 15. No. 4. pp. 856-858.

CHAUFFARD described, as occurring only in cases of hydatid cysts of the liver, a sign which he named *Flot transthoracique* this being obtained by placing the left hand on the posterior surface of the thorax and percussing gently with the right hand over the enlargement of the liver; in such cases a thrill was felt. The author describes this sign as occurring in an amoebic abscess of the liver which was remarkable for its large size and for the very fluid pus (two and half litres) that it contained.

S. R. D.

TURNER (Philip). **Abscess in the Left Lobe of the Liver Ten Years after an Abscess in the Right Lobe.**—*Proc. Roy. Soc. Med.* 1913. Feb. Vol. 6. No. 4. Clin. Sec. pp. 89-90.

The account of a case of recurrent liver abscess, the most noteworthy points being that the first abscess occurred six years after the patient's return to England from the tropics; this abscess was opened and drained and then, after an interval of ten years, a further abscess developed in the left lobe of the liver which was again treated successfully by surgical measures.

No examination of the pus was made for amoebae, no bacteria were found, and no history of dysentery could be obtained.

S. R. D.

CHAUFFARD. **Kyste Hydatique suppuré du Foie. Abcès Dysentérique Amibien du Foie terminé par Vomique.**—*Jl. des Praticiens.* 1913. Feb. 22. Vol. 27. No. 8. pp. 113-114.

The history of two cases, one of a hydatic cyst of the liver, the other of an amoebic abscess of the liver (see below) in both of which the pus was evacuated through a bronchus. The differential diagnosis is discussed at length.

S. R. D.

TREATMENT.

WALDOW. **Uzara, ein neues Heilmittel bei Darmerkrankungen.** [Uzara, a New Remedy for Bowel Complaints.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1913. Feb. Vol. 17. No. 4. pp. 126-130.

In the same periodical (1912, Vol. 16, No. 6, p. 190) the writer along with GÜHNE made a preliminary report on the use of Uzara in tropical bowel complaints. The pharmacology of the drug has been described by GÜRBER [reference not given]. Further experience has shown this remedy to be extremely useful and almost a specific in the treatment of dysentery. In the Cameroons dysentery is extremely fatal to natives, so that evidences of it are often found at post mortem examinations. It is, in fact, more deadly than sleeping sickness. Europeans are also very subject to it. Malnutrition and an unwholesome diet are important exciting causes, in the negro, of both amoebic and bacillary dysentery. Clinically, cases of the former exhibit in the stools not only actively moving amoebae but also the motionless, polynuclear and budding forms which are generally regarded as non-pathogenic. The latter have, however, been detected in a liver abscess by LÜHLEIN, whence the conclusion that here, as in other cases under favouring conditions, a harmless parasite may become pathogenic.

The author discusses the various pharmaceutical treatments in vogue in the locality. Calomel has the disadvantage of causing severe stomatitis in the coloured races, while ipecacuanha has also not proved satisfactory. The proprietary remedy Kades-Antidysentericum has been found untrustworthy. Castor oil and Carlsbad salts have given fair results. From October 1911, however, the author has treated all his cases of dysentery with the liquor and tablets of uzara with striking results. The patients get solid motions in five or six days, and the remedy seems to be particularly efficacious in subduing griping. The dose for adults of the liquor is from thirty to fifty drops thrice daily, and of the tablets five three times daily. Children tolerate well the third of an adult dose.

[Uzara has been put on the market by the Uzara-Gesellschaft, G. m. b. H., Melsungen. It is stated to be prepared from a shrub, N. O. *Asclepiadaceae*, found on the West Coast of Africa.]

S. R. D.

LAVERAN (A.). **Sur le Traitement de la Dysenterie Amibienne et des Abcès du Foie par l'Emétine. (Observations à propos du Procès Verbal).**—*Bull. de l'Acad. de Méd., Paris.* 1913. Mar. 3 ser. Vol. 69. p. 142.

A note pointing out that the credit for the use of emetine in the treatment of amoebic dysentery and hepatitis should not be given entirely to ROGERS, but should, at least, be shared by VEDDER.

He gives a short abstract of VEDDER'S work (see this *Bulletin*, No. 4, p. 175).

S. R. D.

ALLAN (William). **The Emetin Treatment of Amebic Dysentery.**—*Jl. Amer. Med. Assoc.* 1913. Mar. 1. Vol. 60. No. 9. pp. 664-665.

An account of two cases of dysentery treated by subcutaneous injections of emetine.

The first case rapidly recovered, the stools becoming normal on the fourth day, and the amoebae disappeared completely. The doses of emetine hydrochloride given were 1·4 grains per diem.

The second case, which had failed to improve under treatment of salol-coated pills of ipecacuanha, was at first treated with hydrobromide of emetine with no improvement, but analysis showed the sample of the drug used to be faulty. Then emetine hydrochloride was given in doses of 1·5, 1·6 and 2 grains per diem, but the dysentery persisted and amoebae continued to be present in the stools.

The doses of emetine hydrochloride were then increased to 2·4 and 4 grains per diem and the amoebae then disappeared and rapid convalescence took place. Nausea was noticed only when as much as 4 grains of the emetine salt were given.

S. R. D.

CHAUFFARD (A.). i. **Abcès Dysentérique du Foie ouvert dans les Bronches. Guérison rapide par l'Emétine.**—*Bull. de l'Acad. de Méd. Paris.* 1913. Feb. (3 ser.) Vol. 69. No. 7. pp. 122-131. With 5 text-figs.

ii. FLANDIN (Charles) & DUMAS (Réné). **Gros Abcès Dysentérique du Foie ouvert dans les Bronches. Guérison obtenue par le Traitement Chirurgical et les Injections de Chlorhydrate d'Emétine.**—*Bulls. et Méms. Soc. Méd. des Hôpit. de Paris.* 1913. Mar. 13. (3 ser.) Vol. 29. No. 9. pp. 599-605.

iii. CHAUFFARD (A.). **Grand Abcès Amibien du Foie. Guérison rapid par le Traitement Chirurgical suivi de la Cure d'Emétine.**—*Ibid.* Mar. 20. No. 10. pp. 630-633.

iv. **Dysenterie Amibienne Chronique. Guérison rapide par la Cure d'Emétine.**—*Ibid.* Apr. 17. No. 12. pp. 753-758.

v. COSTA (S.). **Abcès Amibiens du Foie, partiellement ouverts dans les Bronches et dans l'Intestin. Guérison par les Ponctions et les Injections d'Emétine.**—*Ibid.* Apr. 17. No. 12. pp. 746-751.

vi. DOPTER. **Traitement de l'Amibiase Hépatique et Inestinale par l'Emétine.**—*Ibid.* Apr. 10. No. 11. pp. 686-689.

All these papers deal with cases of hepatic and intestinal amoebiasis treated by the subcutaneous injections of hydrochloride of emetine, with or without surgical interference. Although several of the cases were in a very critical condition, recovery was uniformly rapid. The doses of emetine hydrochloride administered varied from 2 to 8 centigrams per diem and the longest period over which the injections were given was thirteen days.

In the discussion which followed the reading of DOPTER's paper, ROUGET mentioned further cases treated in the same way, one of which was a case of dysentery occurring in a man who had never been out of France, but who was in the habit of visiting the hospitals in which invalids from the colonies were treated. One of the cases described by CHAUFFARD also occurred in a man who had never left France, but who had, during his military service, been attached to the marine infantry.

S. R. D.

MYER (Jesse S.) & COOK (Jerome E.). **Amebic Dysentery with Special Reference to the Ipecac. Treatment.**—*Interstate Med. Jl.* 1913. Mar. Vol. 20. No. 3. pp. 246-250.

An account of six cases of amoebic dysentery treated with salol coated ipecacuanha pills, the doses of ipecacuanha given being as high as 70 grains in one case. All improved rapidly and, as far as can be traced, have remained well since, the longest period since treatment being six years. In one case trichomonas were present in the stools in addition to amoebae.

S. R. D.

Le Roy des Barres. **Note sur un Cas d'Appendiscostomie pour Dysenterie Chronique.** — *Bull. Soc. Méd.-Chirurg. de l'Indochine.* 1913. Feb. Vol. 4. No. 2. pp. 70-72.

An account of a case of chronic dysentery of five years duration with repeated exacerbations of symptoms, the last one being very severe.

General treatment being without effect, appendicostomy was performed, the colon was washed out with a solution of 1 in 10,000 of permanganate of potash and small doses of calomel were given by the mouth.

This treatment produced rapid improvement and later the appendix fistula closed spontaneously.

S. R. D.

Milian. **Le 606 est un Spécifique puissant de la Dysenterie Amibienne et d'Emétine peut être un Médicament Antisyphilitique.**—*Bulls. et Mêms. Soc. Méd. des Hôpit. de Paris.* 1913. Mar. 20. (3 ser.) Vol. 29. No. 10. pp. 626-630.

The author, having treated one case of dysentery with '606' which was followed apparently by very rapid recovery, thought that as emetine has proved so successful in the treatment of many cases of amoebic dysentery it might prove a useful remedy in syphilitic cases. Five syphilitics were therefore treated by injections of emetine; in two of these no improvement occurred, in the remainder there was an improvement.

S. R. D.

BACILLARY DYSENTERY.

Horimi (K.). **Ueber die pathogenen Wirkungen der Dysenterietoxine.** [On the Pathogenic Action of Dysentery Toxins.] —*Centralbl. f. Bakt.* 1. Abt., Orig. 1913. Mar. 15. Vol. 68. No. 3-4. pp. 342-358.

The present paper is a continuation of the author's researches upon this subject, undertaken with the object of distinguishing the separate actions of the various toxins of the dysentery-bacillus. At the outset of the investigation five different strains of bacillus were used, but ultimately the Shiga bacillus alone was employed. Mice, rabbits, and guinea-pigs were all used as test-animals, but the rabbit proved to be most suitable.

Four separate series of researches were undertaken as follows, to elucidate the various points.

Series I.—The material used consisted of—

a. A sterilized filtrate of the 48 hour broth culture at 37° of the bacillus of dysentery, both the Shiga and the Flexner strains being used.

b. The same, after being kept a fortnight at room temperature.

With both of these fluids, injections were made into the ear-vein of the animals tested and the result showed both fluids to be strongly toxic. With preparations by method (a) of both bacilli 70 per cent. of the animals died between 18 and 38 hours after inoculation. By method (b) the Shiga showed itself the more lethal of the two, proving fatal in every case within 26 hours, while with the Flexner culture only 4 per cent. of the rabbits died within 38 hours, the remainder surviving for periods between 17 and 37 days. With fluids prepared in both ways, characteristic hyperaemia of the small intestine, colon and appendix with haemorrhages was induced, but not of the caecum; the fatal result, however, seemed more to depend upon a neuro-toxic action, as the bowel lesions were not in any case very severe.

Series II.—This series of experiments was intended to elucidate the action of living bacilli. Inoculations as before were made with—

a. 18 hour old broth cultures at 37° not sterilized.

b. Loopfuls of a 24 hour growth on agar rubbed up with 1 cc. of salt solution.

c. A washing of the same culture with 3 cc. of salt solution to dissolve whatever was soluble.

The results obtained with all three liquids were similar to those in the first series of experiments, but more severe, especially with the Shiga strain. Intravenous injection proved much more lethal than subcutaneous or intraperitoneal. The greater lethality was ascribed to the neuro-toxin present in living bacilli. Contrary to what happened in Series I, the caecum was involved in addition.

Series III.—The Shiga bacillus alone was employed. The intention was now to separate the endo- and exo-toxins and both from the neuro-toxin.

1. A 24 hour old agar culture was irrigated with salt solution, and the liquid filtered after standing for 48 hours. This was reckoned to contain exo-toxin only, plus neuro-toxin. This fluid was found to exert a selective action on the caecum only in the way of causing hyperaemia, etc.

2. The same culture was then incubated with more salt solution for 58 hours at 37° C., the liquid being further raised to 60° for half an hour and then filtered. This was reckoned to contain endo-toxin only, and was found to exert a selective action on the small intestine solely, but in order to discriminate further the process was modified as follows.

Series IV.—1. The liquid of Series III (1) was more completely freed from bacilli by centrifuging for four hours.

2. The residue from Series III (2) was rubbed up with 0·4 per cent. caustic-potash solution to dissolve the bacilli, then shaken up with salt solution and filtered.

The selective action then became more manifest, but the liquid (2) in addition affected the colon (hyperaemia etc.).

The author believes from his experiments that the action of the various toxic principles of the dysentery-bacillus can be formulated as follows.—

1. The neuro-toxin, which is the main agent in producing death, is associated exclusively with living bacilli, its effects being most manifest when they are injected into the circulation. It may be washed out of the living bacillus along with exo-toxin by salt solution (Series III (1)).

2. The toxin thus washed out of either living or dead bacilli has a selective action on the caecum (Series III (1)) only.

3. Repeated washings with salt solution of the same bacilli extract an endo-toxin situated in the deeper layers (Series III (2)) which has a specific action on the small intestine.

4. Final solution of the bacilli from Series III (2) liberates a further principle to which the specific action on the colon is due (Series IV (2)).

With broth cultures (Series I) all of these principles would appear to be active except (2), but how this result is brought about the author does not explain.

S. R. D.

SANGIORGI (G.) & BONGIOANNINI (G.). **Una Epidemia di Dissenteria Bacillare in Piemonte.** [An Epidemic of Bacillary Dysentery in Piedmont.]—*Pathologica.* 1913. Feb. 15. Vol. 5. No. 103. pp. 103-105.

Towards the middle of September 1912 a small epidemic broke out in the hamlet of Piana, Rocca di Canavese, having the characters of dysentery and affecting one-fifth of the whole population = twelve individuals. Of these nine were adults and three children. In the latter the symptoms were grave, and led to death in one instance. A post mortem examination was obtained in this case, that of a child aged twelve years. The large intestine was found ulcerated with discrete ulcers from end to end, while the small intestine was entirely free. From this case, and from the stools of others, the authors were able to isolate a Gram-negative, short bacillus, which presented most of the standard culture reactions of a dysentery bacillus, but was not entirely referable to any one of the known varieties. It failed to agglutinate with any of the standard sera.

The infection seems to have been imported into the locality by a soldier invalided from North Africa, who had suffered there for two months from dysentery. Pollution of the drinking water (from surface wells) followed. The authors point out the likelihood of epidemics of the same kind becoming frequent in Italy, as the result of the military occupation of Libya.

S. R. D.

ROUX. **Note sur la Dysenterie Bacillaire et le Sérum Antidysentérique.** [Clinique d'Outre-Mer.]—*Ann. d'Hyg. et Méd. Colon.* 1912. Oct.-Nov.-Dec. Vol. 15. No. 4. pp. 859-861.

The author, after examining the results obtained by VAILLARD and DOPTER with antidysenteric serum in cases of bacillary dysentery, recommends the use of the serum prepared by these authors.

The dose recommended is 40 cc. in severe cases, 20 cc. in the milder ones, repeated next day if necessary.

The prophylactic inoculation of 10 cc. is said to render the patient immune for ten days.

[The author gives no account of any cases coming under his care.]

S. R. D.

FLAGELLATE DYSENTERY.

MELLO-LEITAO. **Flagellate Dysentery in Children.**—*British Jl. of Children's Diseases.* 1913. Feb. Vol. 10. No. 110. pp. 60-66.

In this interesting paper the author discusses briefly the various forms of dysentery. He believes that there is a primary flagellate dysentery, and relates his experiences in the Children's Hospital Dispensary at Rio de Janeiro. He writes: "We have personally observed 54 cases of dysenteric diseases. In the stools which were examined at the hospital laboratory flagellates were found in 32 cases, and *Entamoeba tetragena* in 4 cases. In 2,135 stools encysted forms of *Trichomonas* were found only five times in healthy children, all over four years of age, and twice in non-dysenteric enteritis in children above two years of age. We regard the presence of flagellates in dysenteric stools as more than a mere coincidence for the following reasons: Flagellates were never found in children under four years without there being enteritis, and the diarrhoea was always dysenteric in the children who were under two years."

"In the cases of dysentery with flagellates present in the motions, as soon as the flagellates disappeared improvement took place and disappearance of the cysts indicated recovery."

"Flagellate dysentery is the commonest variety of infantile dysentery, and is rather more frequent in children under five years than in adults. The flagellates most commonly found in the stools are *Trichomonas intestinalis* (Leuckart), *Lamblia intestinalis* and *Cercomonas hominis*."

"In thirty-two cases of flagellate dysentery which we observed, *Lamblia* and *Trichomonas* were present as follows: *Trichomonas intestinalis* in 9 cases; *Lamblia intestinalis* in 3 cases; *Trichomonas* plus *Lamblia* in 20 cases. In five cases with flagellates and no bowel trouble *Trichomonas* only was present; of the cases of enteritis without dysenteric motions, one showed *Trichomonas* only and another *Lamblia* only."

"In order to show the pathogenicity of flagellates in children's dysenteries, we give below the occurrence of flagellate dysentery and also of dysenteries without flagellates or amoebae as well as the occurrence of flagellates in healthy children:

Age.	Flagellate dysentery.	Other dysenteries.	Flagellates in health.	Notes.
Under 1 year	7 cases.	4 cases.	0 cases.	—
" 1-2 years ...	8 "	6 "	0 "	—
" 2-3 " ...	5 "	4 "	1 "	Enteritis.
" 3-4 " ...	4 "	1 "	1 "	Diarrhoea.
" 4-5 " ...	2 "	0 "	0 "	—
" 5-6 " ...	1 "	1 "	1 "	—
" 6-7 " ...	2 "	1 "	1 "	—
" 7-9 " ...	1 "	0 "	2 "	—
" 9-12 " ...	2 "	1 "	2 "	—

"Sex has no influence in flagellate dysentery; 17 of our cases occurred in boys and 15 in girls. Flagellate dysentery is more frequent at the end of summer and in the first months of autumn."

"The onset is, as a rule, not abrupt, but is preceded for a day by diarrhoea with faecal motions, and by fever. The next day the stools contain mucus and blood and become dysenteric. Free flagellates are then abundant in the evacuations. The motions rarely exceed twenty *per diem*; the greatest number of motions which we observed was twenty-two in the twenty-four hours. They always contain only a little blood and an excess of mucus."

"A diagnosis between flagellate and other dysenteries by the clinical phenomena only is impossible in most cases, but very easy by microscopic examination of the stools."

"Treatment is simple; magnesium sulphate (7 per cent.) and water diet (in infants under two years) or milk (over two years) will be efficacious in most cases. Sometimes, however, enemata of collargol (1 per cent.) or electrargol are required."

The author's summary is as follows:—

"(1) To the other forms of dysentery a primary flagellate dysentery is to be added.

"(2) Flagellate dysentery is due to *Trichomonas intestinalis* (Leuckart) and *Lamblia intestinalis* (Lambl.), either separately or in combination.

"(3) Flagellate dysentery is a benign disease, and the most frequent form of dysentery in infants.

"(4) *Trichomonas* and *Lamblia* are pathogenic to infants under three years.

"(5) Flagellate dysentery does not depend on the infant's diet."

H. B. Fantham.

Escomel (E.). **Sur la Dysenterie à Trichomonas à Arequipa (Pérou).** —*Bull. Soc. Path. Exot.* 1913. Feb. Vol. 6. No. 2. pp. 120-122.

The author states that he has collected 152 cases of dysentery due solely to Trichomonas. The parasite is only one-fourth the size of the variety found occasionally in the vagina. In microscopical preparations the movements of these organisms was noticed to stop after a variable interval, and they became encysted.

Cultivations were obtained in a broth made from lettuce stalks after an interval of 25 days.

Experiments on animals, when carried out on dogs, were successful, both when the infected stools and cultures of the trichomonas were used, the animals being affected with diarrhoea for about seven days; during the attack active organisms were found in the stools, after recovery only encysted forms could be discovered.

Examination of the reservoirs containing the water for drinking purposes showed the presence of trichomonas; after cleaning these reservoirs none were found and no further case of dysentery occurred.

Treatment with ipecacuanha and calomel proved to be useless, but the author, acting on the suggestion of Hunter, found that turpentine, both *in vitro* and *in vivo*, rapidly killed off the trichomonas.

The method of administration was to give 2 to 4 grams of essence of turpentine in an emulsion by the mouth and enemata containing 15 to 20 drops of turpentine emulsified in the yolk of an egg, to which was added a little water and tincture of opium.

S. R. D.

MIXED.

MILLOUS. **Remarques sur des Cas de Dysenterie à Thanh-hoa en 1912.**—*Bull. Soc. Méd.-Chirurg. de l'Indochine.* 1913. Jan. Vol. 4. No. 1. pp. 7-13.

The only facts of interest in this paper are

1. The seasonal prevalence of dysentery, which commences in April and lasts till the end of September, the maximum occurring in June.

2. Clinically two types were noticed. The first, occurring in April and May was very severe, was accompanied with fever, and had a very high mortality, 50 per cent. This type the author believes to be bacillary, but as his investigations consisted of microscopical examination of the stools and the agglutination of a stock culture of *B. dysentericae*, Shiga in dilutions up to 1 in 30, this statement cannot be considered proved.

The second type, which occurred most frequently in August and September, was not accompanied with fever, the mortality was much less, and on microscopical examination of the stools amoebae were seen. These amoebae were very imperfectly studied.

An account of a case is given in which a protozoon which the author believes to be a flagellate was found.

S. R. D.

MISCELLANEOUS.

DARLING (S. T.). i. **The Rectal Inoculations of Kittens as an Aid in determining the Identity of Pathogenic Entamoebae.**—*Bull. Soc. Path. Exot.* 1913. Mar. Vol. 6. No. 3. pp 149-153.

ii. **Budding and Other Changes described by Schaudinn for *E. histolytica* seen in a Race of *E. tetragena*.**—*Trans. Soc. Trop. Med. & Hyg.* 1913. Apr. Vol. 6. No. 5. pp. 171-173: and *Jl. Amer. Med. Assoc.* 1913. Apr. 19. Vol. 60. No. 16. p. 1220.

Darling has previously shown that the trophozoites of *Entamoeba tetragena* undergo developmental changes when inoculated rectally into kittens, and in the present paper details and extends his results. The study of experimental dysentery, easily provoked in kittens by rectal injection of fresh material from dysenteric stools, convinces him that degenerative nuclear changes in Entamoebae do not occur more easily in kittens than in man. The inoculation material should be as fresh as possible.

Trophozoites of *E. tetragena* from man are large, with relatively small nuclei, and no chromidia " (crystalloidal substance? Chatton) ". Cysts are never seen. If successful treatment be given or recovery occurs, the trophozoites disappear from the stools and infection terminates. The morphological character of the nucleus is very important in such cases and consistency of technique is essential, as different appearances result from the use of different fixatives and different modifications of haematoxylin. Amoebae, wet fixed with Schaudinn's fluid, stained with iron haematoxylin or iron haematein show a small, faint staining centriole, peripheral chromatin neither pronounced in quantity nor in intensity of staining, with a karyosome represented by a faint ring or invisible. Using Zenker or Flemming's solution and staining with Mallory's phosphotungstic acid haematoxylin, the centriole is more densely stained, there is more peripheral chromatin staining deeper and the karyosome is still faint but definite. The technique recommended is: "Fixation in Zenker's fluid diluted one-fourth or one-eighth, or in Flemming's solution, staining in phosphotungstic haematoxylin and differentiating with weak potassium permanganate solution".

In relapses or prolonged untreated cases of entamoebic dysentery, a generation of smaller trophozoites is associated with or replaces the larger ones. In stools they are frequently refractile and, if so, stain very slowly intra vitam with gentian violet. So stained, two features characterise this, the "smaller, senile or precyst generation":—(1) the presence in the cytoplasm of blocks of the crystalloidal substance of CHATTON, (2) the very prominent, densely stained karyosome. Darling believes this generation to be that described by ELMASSIAN as *E. minuta* and by others as *E. tetragena.*

Some cases of entamoebic colitis have small cysts with 1, 2, or 4 nuclei and blocks of chromidia, associated with the precyst generation; later when the colitis has gone, it is possible to find *tetragena* cysts in stools without mucus, thus completing the cycle of the parasite in man. "It may be conceived that of the three phases mentioned:—(a) the dysenteric trophozoite, (b) the precyst trophozoite and (c) the cyst, (a) represents something analogous to adolescence and (b) to maturity and senility." These "terms represent corresponding infecting powers of the trophozoites in any given case of entamoebic colitis". . . . . "If kittens be inoculated rectally with material from an adolescent or *histolytica*-like strain, the strain may be carried on upon the death of the preceding kitten for four, five or six transfers, the strain thus taking about one month for its sojourn in the colon of the kitten, but if, on the other hand, a chromidia-containing senile "tetragena"-like strain be injected rectally into kittens, it cannot be carried through more than one or two transfers". In the colon of the kitten the senile strain encysts.

The colon of a kitten (weight 500 to 700 grams), particularly the caecum, is the nearest approach to a culture tube for *E. tetragena* and developmental changes of the amoebae occur there much as in untreated human dysentery. Because of the shorter duration and fatal issue in kittens, it is necessary to trans plant the culture to another kitten, when the first is dying, or soon after, and by this process only can the age of adolescent strains be prolonged, and appearances of maturity observed. The stages in "the transformation of a histolytica-like trophozoite into a senile tetragena-like trophozoite" can thus be traced.

This method is of much value where there is doubt or disagreement as to the nature of the amoebic trophozoites in cases of dysentery. Rectal injections into kittens of fresh material containing trophozoites should be made, and wet fixed stained preparations of trophozoites from remove to remove made to see if they correspond to *E. tetragena* or some other form.

Some preparations from the last remove may have pathological trophozoites, recognised by the appearance of buds peripherally and by " extrusion of chromidia, nuclei and portions of cytoplasm." The staining powers of the nuclei are less sharp than in normal organisms.

In conclusion, " The writer believes that cases thought to be ' histolytica ' dysentery will resolve themselves into infections by *E. tetragena.*"

"*E. histolytica*" is, in all likelihood, a spurious species, having been described from degeneration forms in senile races of *E. tetragena.*

H. B. F.

JAMES (W. M.). **Infection with *Entamoeba tetragena*.**—*New York Med. Jl.* 1913. Apr. 5. Vol. 97. No. 14. pp. 702-705.

The author has studied the various amoebae found in Panama district. He has found that the commonest cause of the dysentery of this region is the *Entamoeba tetragena* which accounts for 70 per cent. of the cases.

In the author's opinion the *Entamoeba tetragena* is a distinct variety from the *Entamoeba histolytica*, the differences which he lays special stress on being—the large size of the nucleus of *E. tetragena*; the fact that in cases infected with *E. histolytica* no cysts are ever discovered as is commonly observed in cases infected with *E. tetragena*. During intervals between the attacks of dysentery the amoebae are more easily differentiated, as *E. tetragena* is then found to be much smaller and less active and resembles in every way the amoebae described by ELMASSIAN and named by him *Entamoeba minuta*.

All the author's cases yielded quickly to treatment with bismuth; the cases due to *E. tetragena* appeared to be milder but more chronic.

The first part of the paper is occupied by the account of a case in which both *Entamoeba histolytica* and *E. coli* were found. This case rapidly improved under treatment, but after the administration of a saline purge large numbers of *E. tetragena* were found, both free and encysted; after three months the case relapsed, *E. tetragena* being again found.

S. R. D.

VONWILLER (Paul). **Ueber den Bau der Amoeben.** [The Structure of Amoebae.]—*Arch. f. Protistenkunde.* 1913. Feb. 20. Vol. 28. No. 3. pp. 389-410. With 1 plate.

The author gives first a detailed account of the intra vitam reactions of a multinucleate amoeba, since found to be *Amoeba* *nobilis*, Penard, and of *Amoeba proteus*, both occurring in fresh water aquaria in the laboratory of Würzburg. The second part of the paper is devoted to an examination of the structure of these Amoebae, comparison being made throughout with the results of other workers. Owing to its nature it is impossible to summarise the paper adequately and those interested should consult the original.

The chief intra vitam stains used were methylene blue, Bismarck brown and neutral red. The author summarises his results in the following table:—

There colour with:—

	Food	Albuminous	Crystal	Tiny
Neutral red ...	vacuoles.	grains.	grains.	granules.
Bismarck brown	,,	,,	,,	—
Methylene blue	,,	?	—	—

The time necessary for a reaction and the amount of colouring both need attention. Also chemical changes should be noted as indicating acid or alkaline reactions.

The structure of the protoplasm, albuminous grains, crystals, tiny granules and the vacuole are then discussed in detail and some notes given on the structure of the nucleus of the two species of Amoebae. Finally the author establishes the identity of his multinucleate Amoeba with that of *A. nobilis* of PENARD, having received a preparation of that organism from its discoverer. [The whole paper is highly critical and needs reading in detail to be appreciated.]

H. B. F.

MATHIEU. **Les Colites Dysentériformes Graves et Hemorragiques: leur Diagnostic Différentiel et leurs Indications Opératoires.**—*Jl. des Practiciens.* 1913. Apr. 12. Vol. 27. No. 15. pp. 225-227.

The author discusses the use of the sigmoidoscope as a means of diagnosis and gives descriptions of the various appearances observed by these means in bacillary dysentery, amoebic dysentery, carcinoma of the rectum, tubercular ulceration, syphilitic ulceration, etc. etc.

He then discusses surgical treatment and recommends appendicostomy in severe cases rather than colotomy or short circuiting of the ileum into the rectum.

S. R. D.

NORMET. **Un Nouveau Signe Clinique differential de la Dysenterie Amibienne et de la Dysenterie Bacillaire.** [Clinic d'Outre-Mer.]—*Ann. d'Hyg. et Méd. Colon.* 1912. Oct.-Nov.-Dec. Vol. 15. No. 4. pp. 861-864.

After pointing out that bacillary dysentery is much more frequently accompanied by fever than the amoebic variety and that in the bacillary type the recovery is much more rapid and sudden, the author states that frequently a differential diagnosis

may be made by giving the patient an enema of either a 0·5 per 1000 solution of permanganate of potash or a 1 per 1000 solution of nitrate of silver.

In cases of bacillary dysentery such an enema produces no discomfort, while in the amoebic type a good deal of pain is produced which lasts for some time after the bowel has been emptied.

S. R. D.

STILES (Ch. Wardell). **Contamination of Food Supplies. The Value of Protozoa as an Aid in Determining Fecal Contamination of the Food Supply.**—*U.S. Public Health Rep.* 1913. Feb. 14. Vol. 28. No. 7. pp. 290-291.

The author suggests as a method to ascertain if the food supply of a community is faecally contaminated the examination of the faeces of the various individuals of that community for the three following protozoa—*Entamoeba coli*, *Lamblia duodenalis (intestinalis)* and *Trichomonas intestinalis*.

He points out that all these protozoa are parasitic to the intestinal tract of man, that they all have an encysted stage which may be either air-borne or easily conveyed to food etc. on the bodies of house flies. In some communities very large percentages of the inhabitants are infected with one or other of these parasites, ten to forty per cent. being not uncommon, and even in some cases sixty per cent. of the population having been found harbouring such parasites.

The practical application of these observations is that whenever these parasites are found in a large percentage of the members of a community means should be undertaken to improve the methods used for the disposal of dejecta so that the food supply should be more carefully protected against faecal contamination.

S. R. D.

SPRUE.

CASTELLANI (Aldo) & LOW (G. C.). **The Rôle played by Fungi in Sprue.**—*Jl. Trop. Med. & Hyg.* 1913. Feb. 1. Vol. 16. No. 3. pp. 33-35.

The authors in studying eight cases of sprue found fungi either in the saliva or stools in seven; in the one in which no fungi were discovered the stools were not frothy and were not acid in reaction. The following fungi belonging to the genus *Monilia* were isolated:—*M. enterica, M. faecalis, M. insolita, M. intestinalis, M. rotunda,* all of which had been previously described by one of the authors (A. C.). In addition another member of the genus *Monilia* was found in scrapings from the tongue of one of the patients.

This fungus grows very abundantly on slightly acid media, giving rise to round colonies which rapidly coalesce into creamy white masses with a smooth surface; when examined microscopically a few mycelial forms are seen, but the commoner form is yeast-like. Growth occurs on alkaline media, but is less abundant.

Biochemical reactions were as follows: acid and gas were produced in broth containing glucose, maltose, and laevulose; acid only in the case of saccharose, dextrin, galactose and glycerine.

A long and very complete table of the biochemical reactions of all the known Monilia is given. All these fungi have been found in cases not suffering from sprue.

Experiments on animals were negative except when massive doses were injected intraperitoneally, when a purulent peritonitis resulted. Subcutaneous inoculation produces agglutinins specific to the variety of Monilia.

The authors found that when the patients were treated with large doses of bicarbonate of soda the fungi disappeared from the stools, and that the symptoms of flatulence and the frothiness of the stools were much diminished.

The conclusion reached is that fungi are not the cause of sprue, but that they may produce the frothiness of the stools and the symptoms of flatulence.

S. R. Douglas.

VERRUGA PERUVIANA.

Cole (H. N.). **Verruga Peruviana and its Comparative Study in Man and the Ape.**—*Arch. Internal Med.* 1912. Dec. 15. Vol. 10. No. 6. pp. 668-674.

In this paper the author has gathered together from various observers the history, clinical symptoms etc., of this very interesting disease, which, as he says, is likely to become more important when the Panama Canal is opened. The most complete account is to be found in the monograph of Odriozola "La Maladie de Carrion" ou "La Verruga Peruvienne". The case of a European guide is described, who contracted the granulomatous form of the disease during an enforced short residence in the infected locality. On returning to Switzerland the man was under the care of Jadassohn in the Berne Clinic, having at that time many cutaneous growths. Several of the tumours were excised, and from them cultures on various media were made without success. Rabbits, guinea-pigs, doves, chickens, rats, and a dog were inoculated, also without success, but in a Cercopithecus and two Rhesus monkeys similar tumours to the third generation were produced. It is noted that in neither the man nor the monkeys were any of the peculiar blood changes found, which have been described in the acute form of the disease known as Oroya fever, and the author states that it will require much further study before it is possible to say whether the "Fiévre grave de Carrion" (Oroya fever) and "Eruption de Carrion" should be classed as a single disease, or as two clinical and distinct entities.

P. W. Bassett-Smith.

Monge (Carlos). **The Haemoleucocytic Formula in Carrion's Disease. or Verruga Peruana.**—*Jl. Lond. School of Trop. Med.* 1912. Vol. 1. Part 3. pp. 239-242.

From 1908 to 1910 Monge studied the blood variations of over one hundred cases of this disease. Further observations have confirmed his earlier results. He notes two types of cases—an acute or severe form, which nearly always terminates in death, and an eruptive form, which is generally mild and of long duration. In the former the blood was examined daily, in the latter weekly.

Acute form.—This is characterised by the very rapid production of severe anaemia, the red cells being reduced even as low as 500,000 per c.mm., with extraordinary alterations in their size, shape, and colour, nucleated forms both normoblasts and megaloblasts being present; in one fatal case there were 15,300 of the former, and 3,420 of the latter per c.mm. Polychromatophilia and granulation of the red cells were also very marked. The leucocytes were always greatly increased in number (20,000 and upwards), with an early relative increase in polymorphonuclears, a decrease in the mononuclears, and a disappearance of the eosinophiles; the nuclei of the polymorphonuclears were rarely much lobulated, more often simply bilobed.

Chronic eruptive form.—At first there was a great fall in the number of red cells, with much irregularity of size, shape, and colour, but as the disease progressed the signs of this anaemia became less and less evident; the leucocytes at the commencement were increased in number, later in the disease they were nearly normal. The changes found in the relative proportions of the different forms of the white cells during the course of the disease are very remarkable. The early high polymorphonuclear increase, with absence of eosinophiles, gives place to a great relative increase of the mononuclears (50 to 60 per cent.) with presence of eosinophiles. The author concludes that the study of the haemoleucocytic formula is of great assistance in the prognosis and treatment of the disease.

The acute disease is sometimes called "Oroya fever."

[The reviewer, who has had the opportunity of studying a number of blood films, which were sent to him by Dr. GASTIABURU of Lima, was struck by the remarkable number of nucleated red cells present and by the great variation in the character of their nuclei. The granulations in the red cells were so large and irregular that they suggested the possibility of a minute intracorpuscular parasite. (*Brit. Med. Jour.* 1909. Sep. 18. p. 783.)]

P. W. B.-S.

MAYER (M.), ROCHA-LIMA (H.), & WERNER (H.). **Untersuchungen über Verruga Peruviana.** [Researches on Verruga Peruviana.] —*Munchen. Med. Wochenschr.* 1913. Apr. 8. Vol. 60. No. 14. pp. 739-741.

A description is given in this paper of the case of a young sailor who had travelled from Lima and had climbed the Andes in Peru. Soon after his return to Lima in April, 1912, he was attacked with a severe fever and was treated in the hospital there for 2½ months; this fever was uninfluenced by quinine and disappeared spontaneously. Fourteen days after his discharge from the hospital the fever recurred and was associated with a nodular eruption; this eruption lasted from July to December, when he was admitted into the Seamen's hospital at Hamburg. At that time he had also malarial fever with the presence of parasites, amenable to quinine, and his spleen was enlarged. There was an erythema over the legs and arms with a nodular eruption, the nodules being a cherry red colour and generally hemispherical in shape; these had either a dry shiny surface or more commonly were like mucous patches; subcutaneous nodules were also present. The blood showed a decrease in the number of red cells and a relative mononuclear increase. The eruption varied from day to day, fresh nodules appearing, others drying up, and some becoming haemorrhagic. The patient was discharged cured on Feb. 7, 1913, after he had received three intravenous injections of salvarsan. The character of the eruption was that of Verruga, 'and the typhoid-like fever with the nodular eruption was probably "Carrion's fever."' The serum tested with B. para-typhosus gave no evidence of agglutination.

A pathological examination of the nodules by smears showed a number of spindle shaped cells with large oval nuclei, the protoplasm being free from granules. When stained by Giemsa in some cells two kinds of inclusions were found; the smallest forms were placed at the side, or near one end of the nucleus, and stained bright red; the larger were about the size of an erythrocyte, staining bright red or brick red. These inclusions are described as Chlamydozoa. Histological examination of the verruga nodule showed a marked proliferation of the vessels, associated with oedema and a small celled infiltration around the vessels, with the formation of compact tumour-like strands of tissue and cell nests; many of the cells were spindle shaped or branched. In the protoplasm of many of the cells inclusions were found similar to the chlamydozoa inclusions of other diseases; these were quite different from the granules found in leucocytes and mast cells, the shape, number, and position of most of the inclusions excluding the possibility of their being degenerated nuclei, or fragments of red cells. The circumstance that a specific tissue proliferation of this nature is a peculiarity of chlamydozoa diseases makes the above assumption possible. In the external part of the superficial cutaneous nodes a cavernous structure was seen. A series of monkeys were inoculated; positive results were obtained in four cases, thus showing that the verruga nodule can be transmitted. The incubation period of the first passage was 34 to 45 days, that of the second 21 days. The monkeys showed very few of the characteristic blood changes found in man.

P. W. B.-S.

ANNUAL REPORTS.

BRITISH GUIANA. **Report on the Peter's Hall Medical District for the Year 1911-1912.** [FERGUSON (J. E. A.), Government Medical Officer.] Received in Colonial Office Jan. 21, 1913.

Ankylostomiasis.—When the author took charge of his district in 1904, he found this disease exceedingly prevalent on the estates. The great majority of the coolies harboured the parasite, which greatly impaired their efficiency as labourers. In both sexes deaths from acute ankylostomiasis were frequent. A system of treatment was adopted in November 1908 on a few voluntary subjects. The author gave each a cachet of ten grains of thymol every night for a period of many weeks. This dose did not interfere in the least with their ordinary occupation. Repeated microscopical examination of the faeces showed a gradual diminution of the number of ova until at the end of four months they disappeared completely. This long continued course of thymol produces no ill effects whatever and completely cures the infection. The experiment was then extended and numbers of infected persons were put on what the author calls his "thymol list." The first batch of coolies, placed on the list in February 1912, has been re-examined and nearly all of them were found free from ova and were therefore taken off the list permanently. It is proposed to examine the others after four months of treatment. Already there has been a great diminution of ankylostomiasis as a result.

Malaria.—In April 1910 the author began to give quinine systematically to the coolies in the estate barracks as a preventive against malaria. The children received the treatment first, the adults later. The results have been striking and are seen in the marked reduction in the number of cases and deaths from fever.

The author believes that there is every reason to hope that, with the entire elimination of the ankylostome from these estates by the method described above and the more complete control of malaria by still greater care in the administration of quinine, the birth rate on these estates, in spite of the inequality of the sexes, can be kept well above 30 per thousand and the mortality considerably below 20.

G. C. Low.

CYPRUS. **Annual Report and Medical Statistics of the Island of Cyprus for the Year 1912.** [CLEVELAND (M. A.), Chief Medical Officer.] MS. Report, dated Cyprus, Mar. 17, 1913.

The general health of the inhabitants and the sanitary condition of the Island for the year have been satisfactory.

Malaria.—This disease seems to have been more prevalent than usual and more cases have been treated by the Government Medical Officers. The subjoined table indicates this increase:—

Year.	Nicosia.	Larnaca.	Limassol.	Famagusta.	Papho.	Kyrenia.	Total.
1907 ...	1,310	2,020	1,690	1,456	734	401	7,561
1908 ...	3,251	1,659	1,412	2,406	1,389	629	10,746
1909 ...	2,640	1,045	1,293	1,103	935	434	7,450
1910 ...	948	938	1,502	1,322	829	535	6,074
1911 ...	2,138	1,438	1,390	1,016	676	540	7,198
1912 ...	2,561	1,583	1,815	2,889	711	476	10,035

Epidemic Cerebro-spinal Meningitis.—24 cases of a mild type of this disease with one death were notified during the year under discussion. In each case strict isolation and thorough disinfection was carried out, and although it is not known how the disease is transmitted these measures appeared to be beneficial.

Leprosy.—Fewer cases of leprosy have been admitted into the Leprosy farm during 1912 than in previous years. Though it may perhaps seem premature to express a definite opinion, the disease seems to be decreasing. As far as is known all fresh cases are sent up to the farm for isolation as soon as symptoms of the disease show themselves.

G. C. L.

FIJI. **Annual Medical Report for Fiji for 1911.** [LYNCH (G. W. A.).]—Printed for the Legislative Council, Fiji, 1912. Received in Colonial Office Jan. 13, 1913.

The death-rate for 1911 for all races in the Colony, including Rotuma, was 33·11 per thousand, against 35·44 per thousand in 1910; 29·31 per thousand in 1909; and 31·38 per thousand in 1908. If the Rotuma figures are omitted the rate comes out at 30·10 per thousand. The European rate was 12·34 per thousand, against 19·10 in 1910. The Fijian rate was 37·69 per thousand, against 41·24 per thousand in 1910. The Indian rate was 18·24 per thousand, against 25·91 per thousand in 1910.

The European figures are striking for a tropical country, and even allowing for the fact that a large number of this part of the community retire from Fiji after a certain age, and that some invalids go away and do not return, the rate must be considered a low one. Among Fijians the heavy death rate is amongst the children.

Dysentery.—Large numbers of cases of this disease [variety not stated] were treated in all the hospitals throughout the colony. At the colonial hospital there were 274 cases with 15 deaths. In 1910 there were 353 cases with 12 deaths. In the provinces also high figures were reported.

Yaws.—This disease is becoming less frequent. Hospital returns, of course, show large numbers of admissions, but these are in most cases for the late manifestations of the disease. Much benefit has accrued to these cases by salvarsan treatment, and the use of this drug is now being extended to the provincial hospitals.

Leprosy.—All lepers are now being transferred to Makogai, an island in the central part of the Fiji group, some 18 miles east of Levuka and about 70 miles from Suva. The island is two and seven-eighth miles in length and two miles in breadth and the area consists of 2,075 acres. The island has been purchased by the Government and a special station erected for the lepers.

Ankylostomiasis.—This condition is in many instances introduced by Indians imported for the plantations. On one plantation the medical officer has instituted regular week-end treatment for patients suffering from the disease with, so far, very excellent results. It is now proposed to do the same for the patients in the Suva gaol, and on other plantations where the disease is prevalent. With this, together with improved sanitary inspection and conditions, it is hoped to eradicate or at least materially to reduce the disease.

Filariasis.—The results of filarial infection continue to be seen in all its manifestations in all parts of the colony. So long as vast areas, which cannot be made mosquito-proof except at enormous cost, exist it is difficult to see how the disease can be diminished. Efforts are now being directed towards the better sanitation of towns and their surroundings, by improvement in latrines, town and house cleanliness, use of mosquito screens, and the clearance of bush and scrub for some distance round each town.

Dengue Fever.—84 cases were admitted into the colonial hospital during the year, of which number 18 were Europeans. There were no deaths. 957 cases were treated in the plantation hospitals and 290 in the provincial ones. Typical dengue fever is endemic in the colony and few new-comers escape. The disease attacks the latter with considerable severity in most cases and the symptoms in the majority of instances are quite typical.

Tinea imbricata.—Numerous cases of this parasitic disease continue to be treated in many parts of the colony, both at provincial hospitals and by native medical practitioners at their stations. For treatment sulphur fumigation has been adopted with very good results. By this means and by other hygienic measures it is hoped in a short time to stamp out the disease.

G. C. L.

GIBRALTAR. **Annual Report on the Public Health of Gibraltar for the Year 1912.** [FOWLER (C. E. P.).]—Gibraltar: Garrison Library Printing Establishment, 1913.

Undulant Fever.—Three cases only were notified, and in two the infection was, without doubt, contracted in Spain. The origin of the other case was uncertain. The blood of the majority of the goats on the Rock was tested during the year. Only about five per cent. are now found to yield a reaction to the *Micrococcus melitensis*, in comparison with about ten per cent. a few years ago. Further, the reaction in the positive cases is a very feeble one.

G. C. L.

MALAY STATES. **Report from the Institute for Medical Research for the Period April 1st to September 30th, 1912.** [FRASER (H.), Director.]—*Rept. of Advisory Committee for Trop. Diseases Research Fund for* 1912. pp. 153-168. (1913. London: H.M. Stationery Office. [Cd. 6669.])

The report deals, amongst other subjects, with beriberi, leprosy, blackwater fever, cholera, plague, rabies, cysticercus cellulosae, and the bacteriological examination of waters.

Beriberi.—Fraser says that there are political and commercial difficulties which hinder the application of preventive measures, so that even in the most favourable circumstances cases and epidemics of the disease must continue to occur. In 1911 there were admitted into the Government hospitals of the Federated Malay States 5,540 cases of beriberi of which 695 died. In Perak 1,615 cases were admitted to hospital, as compared with 1,622 in 1910. In Negri Sembilan there was an increase both in the number of cases treated and in the percentage of deaths. These cases were almost wholly confined to the Chinese, of whom, according to the census of 1911, there are 433,244. In the Straits Settlements 2,056 deaths occurred in 1911, as against 1,737 in the previous year. Such being the case, it was thought desirable to determine if a remedial agent could be prepared from polishings of rice. As collected in the rice-mills, polishings are mixed with dust and adventitious substances. The mixture does not look palatable either as a gruel or as an emulsion, and an adult accustomed to the use of polished rice would require not less than 1·75 ounces of polishings daily. In this form one would be administering a quantity of substances which are unnecessary and perhaps even undesirable for a sufferer from beriberi, but if the active substances could be separated from the mixture and given in a readily available form, an agent might be obtained which would be of value in the treatment of patients. It by no means follows of course that that substance, the absence of which from a diet gives rise to disease, will induce recovery in sufferers from that disease.

A series of experiments was conducted on fowls, the results of which were favourable, and experiments are now in progress with a view to determining if the remedy can be prepared by a less expensive process, for example by employing weaker alcohols or water. The less alcohol contained in the menstruum the more saccharine material passes into solution, but whether or not the presence of this substance is disadvantageous the author has not yet been able to determine. A watery extract resembling malt extract in appearance and consistence might prove valuable both from the curative and nutritive standpoints.

Leprosy.—Experiments were carried out with a view to the cultivation of the bacillus of leprosy. Different media such as those of WILLIAMS, BAYON, and CLEGG were used. Out of 22 patients dealt with, from whom 246 inoculations were made on various culture media, in no single instance was a culture of lepra bacillus obtained. By certain processes of staining and fixing the author believes it is possible to find in films non-acid-fast contaminators, streptothrices and bacilli, approaching in slenderness the lepra bacilli, but on further investigation it has been found that they have no genetic relationship to it. Cultures obtained after incubation for three or four days are invariably those of contaminators; those obtained after prolonged incubation are contaminators which either have been introduced accidentally or have grown through the cotton-wool plugs.

Blackwater fever.—FLETCHER in his report on this subject states that of recent years, concurrently with a large influx of Europeans and of Indian labourers, the opening up of considerable areas of land for rubber planting and a great increase of malaria throughout the country, there have been a number of cases of blackwater fever, a disease hitherto almost unknown in the Federated Malay States. During the past six months material was received from seven different individuals for confirmation of the diagnosis of blackwater fever. Fletcher's examination resulted in the diagnosis being confirmed in only two. In three of the above cases in which the urine was sent for examination, the dark colour was not due to haemoglobinuria, and in at least one of the cases in which haemoglobinuria was present, it was not due to blackwater fever.

Cholera.—Two cases of this disease were verified by bacteriological examination.

Plague.—In April 1912 the bacteriological examination of the bubo of a patient who had died at the General Hospital, Kuala Lumpur, showed that he had been suffering from plague. On the following day *Bacillus pestis* was found in the primary bubo of a patient at the District Hospital. Both of these cases and two others which occurred in May and June came from a small hamlet, about equidistant from Kuala Lumpur and the town of Ampang, five miles away.

An examination of the rats caught in this place showed that they were suffering from epizootic plague. For some three months, between April 16th, 1912 and July 10th, the Sanitary Officer forwarded to the Institute rats trapped or picked up in the village where these plague cases had occurred. Of 72 rats which were examined, nine were found to be infected with plague. Only four of the rats were brought to the Institute alive and, as fleas generally quit their host as soon as it dies, very few of these parasites were found upon the rats examined; all were of the species *Loemopsylla cheopis* (Rothschild). Among the rats examined were six examples of *Mus musculus* (Linn.) and two shrews, *Pachyura murina* (Linn.). The remainder were all of the species *Mus rattus*. Three of these belonged to the small variety, *Mus concolor* (Blyth), and the rest to the variety *Mus griseiventer* (Bonhote), the common Malay house-rat. The three examples of *Mus concolor* were brought from the same house on the same day and had all died of plague. It is said that this variety of *Mus rattus*, which occurs only eastward of India proper, is the common house-rat in Yunnan, a notorious home of plague.

Rabies.—The brains of seven dogs, suspected to have been suffering from rabies, were examined for Negri's bodies, which were found in five. These five cases occurred in Negri Sembilan, at places so far apart as Seremban, Jelebu, and Gemas, indicating that the disease is spread over a wide area.

Cysticercus cellulosae.—Portions of two pigs' carcases infected with *Cysticercus cellulosae* were sent from the State of Negri Sembilan by the Veterinary Surgeon. One of these pigs had been imported from Saigon and the other from the Island of Balik. This cysticercus has not been met with hitherto in the Federated Malay States. Though the Chinese eat largely of pork, they cook it thoroughly, and *Taenia solium* is very uncommon.

G. C. L.

MONTSERRAT. **Report on the Health and Sanitary Condition of Montserrat for the Year 1912.** [MCPHERSON (J. C.).]—MS. Report. Received in Colonial Office Mar. 4, 1913.

For the year under discussion the rate of mortality was very low and there was little to be noted as regards special causes of disease and death. During October and November ten cases of fever, hitherto undescribed in reports, occurred. This fever was distinguished by low temperature (100-101° F.), general muscular pains and headache. It lasted almost exactly seven days and was followed by great physical weakness. There was no exanthematous rash, but two of the cases suffered from enlargement of the lymphatic glands. The affected persons lived in adjacent houses so that there must have been infection, either directly or by means of a local carrier.

Yaws and filariasis are less prevalent than in other parts of the Leeward Islands, and ankylostomiasis is infrequent. No malaria, yellow fever, dengue or other tropical diseases were noted. Syphilis is common, and tuberculosis also causes a certain number of deaths. Four people died of cancer.

G. C. L.

SOMALILAND. **Annual Medical Report for the Year 1912.** [PAGET (A. J. M.), Senior Medical Officer.]—Received in Colonial Office Feb. 22, 1913.

The general health is considered only as regards the immediate coast belt; no reliable information as regards the interior has been available.

Malaria.—With the exception of malaria in its milder forms insect borne diseases are rare. The total number of malaria cases was 954 with only one death. The record was 1,662 cases in 1911 and 1,155 in 1910. The author believes that with a comparatively small amount of supervision and expenditure these figures could be greatly reduced, but that the chief difficulty would be the obtaining of native co-operation and the prevention of destruction of screens or well covers by the natives in the town of Berbera.

Small-pox.—It has been found almost impossible to prevent this disease from spreading to the country from Abyssinia, where it is endemic. No check can be put upon the caravan routes along which the disease prevails. The outbreak has been met by the formation of camp hospitals some distance from the towns of Berbera and Bulhar. These hospitals consist of large matting huts, capable of holding from 10 to 20 patients. Owing to the dryness of the climate, the author states, these structures have proved efficient. Vaccination is not willingly accepted by the Somalis, who practise inoculation from mild cases. Compulsory vaccination is, however, carried out for all natives who are unvaccinated and desire to leave the country for Aden. 1,386 vaccinations were performed during the year.

Scurvy.—An outbreak of this disease occurred amongst the Indian troops stationed on the coast. It was successfully combated by the administration of camel's milk, this apparently having a high nutritive value and antiscorbutic properties. Vegetable gardens were also started with beneficial results and will be kept up if possible. A special report has appeared on this outbreak (see below).

Rheumatism.—What has been described in the returns as rheumatism was common during the year. The explanation of this, according to the writer of the report, was the general prevailing poverty and consequent exposure at night with insufficient protection during the cooler months. [No account is given of the variety of rheumatism encountered, and the occurrence of such a disease in a very hot and dry climate requires explanation. It might possibly be due to undulant fever.]

Helminthiasis.—Few cases of helminthic disease were recorded. Twelve patients were treated for *Ankylostoma duodenale.*

G. C. L.

SOMALILAND. **Reports on an Outbreak of Scurvy among the Troops in Somaliland during the Year 1912.** [PAGET (A. J. M.).]—Reports to the Secretary of State for the Colonies. Received at the Colonial Office Nov. 2, 1912; and Dec. 28, 1912.

i. The outbreak occurred amongst an Indian detachment of 320 men who were sent to serve in Somaliland. The predisposing factors were the scarcity of vegetables due to the intense heat and the poor water supply.

The disease attacked 22 men of the Indian contingent, 103 men of the 119th infantry, one European and 7 prisoners: or a total of 133 cases. These numbers have gradually fallen to 74 at the time of writing (October 15th) with all cases progressing favourably towards recovery.

The conclusions the author draws from the outbreak are as follows:—

(1) That troops, even if supplied with an otherwise ample ration, if accustomed to vegetables cannot be expected to withstand an indifferent water supply with no fresh vegetables. This is especially so in the case of a normally vegetable feeding race, such as the Hindoos.

(2) The urgent local need for a good, or comparatively good, water supply being established.

(3) The necessity for keeping up local gardens where vegetables and other products could be grown.

ii. In the second report it is stated that with the exception of a single man all the patients completely recovered. In view of the very severe condition of some of the cases such a result is satisfactory. It is specially noticeable that the Mohammedans took far longer than any of the other patients to recover, once the scurvy symptoms became manifest. In the Hindoos, in distinction to the other or Mohammedan races affected, the principal symptoms were in the gums. The author draws attention to the remarkable circumstance that extensive local experience has entirely confirmed the failure of lime juice to effect a speedy cure of the symptoms. He can give no explanation of this. He believes that Indian troops would be much benefited if a regular camel-milk ration, of a pint per man per day, were given, even though this entailed a sacrifice of the meat ration.

G. C. L.

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